

# Oxygen and magnesium mass-independent isotopic fractionation induced by chemical reactions in plasma

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## 1

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- 5
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### 15 Author Contributions:

- 16 F.R. designed the project and run the experiments. F.R. and M.C. wrote the paper and
- 17 interpretation. S.M. and A.G. analyzed the isotopic composition with the NanoSIMS.
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- References Figure 1-3 with captions (embedded in the Text) Schemes 1-3 (embedded in the Text). Supplementary Informations.
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#### 29

#### 30 Abstract

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Enrichment or depletion ranging from -40 to +100% in the major isotopes <sup>16</sup>O and <sup>24</sup>Mg were observed experimentally in solids condensed from carbonaceous plasma composed of CO<sub>2</sub>/MgCl<sub>2</sub>/Pentanol or N<sub>2</sub>O-Pentanol for O and MgCl<sub>2</sub>/Pentanol for Mg. In NanoSims imaging, isotope effects appear as micrometer size hotspots embedded in a carbonaceous matrix showing no isotope fractionation. For Mg, these hotspots are localized in carbonaceous grains which show positive and negative isotopic effects so that the whole grain has a standard isotope composition. For O, no specific structure was observed at hotspot locations.

These results suggest that MIF (Mass Independent Fractionation) effects can be induced by chemical reactions taking place in plasma. The close agreement between the slopes of the linear correlations observed between  $\delta^{25}$ Mg *vs.*  $\delta^{26}$ Mg and between  $\delta^{17}$ O *vs.*  $\delta^{18}$ O and the slopes calculated using the empirical MIF factor  $\eta$  discovered in ozone<sup>(1,2)</sup> attests to the ubiquity of this process.

Although the chemical reactants used in the present experiments cannot be directly transposed to the protosolar nebula, a similar MIF mechanism is proposed for oxygen isotopes: at high temperature, at the surface of grains, a mass independent isotope exchange could have taken place between condensing oxides and oxygen atoms originated form the dissociation of CO or H<sub>2</sub>O gas.

#### 49 Significance Statement

50 Paste vour significance statement here. Please note that it should not exceed 120 words, but should be at 51 least 50 words in length. It should not include any references. Both the physical effect and the chemical conditions at the origin of the oxygen isotope variations 52 53 in the solar system have been a puzzling question for 50 years. The data reported here with a new 54 experimental protocol bring the MIF effect (Mass Independent Fractionation) originally identified on 55 ozone back to the center of the debate. Similarly to Titanium isotopes, we observe that the MIF 56 effect for O and Mg is triggered by redox reactions in plasma. These observations reinforce the 57 idea of a universal mechanism observable in photochemical reactions when molecular collisions 58 involving indistinguishable isotopes yield a symmetrical complex stabilized as a chemical product. 59

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#### 61 Main Text

#### 63 Introduction

65 Since their discovery in 1973 in the Calcium-Aluminium rich inclusions of the carbonaceous chondrites<sup>(3)</sup>, it has been shown that large enrichments and depletions in <sup>16</sup>O were ubiquitous in 66 the solar system, among meteorites, terrestrial planets and the Sun<sup>(4-6)</sup> and a prominent feature of 67 68 atmospheric chemistry<sup>(7-10)</sup>. They were evidenced from the fact that, in a three oxygen isotopes diagram, nearly all solar system samples have isotopic compositions (reported in ‰ variations as 69  $\delta^{17}$ O versus  $\delta^{18}$ O values,  $\delta^{m}$ O<sub>sample</sub> = [(R<sub>sample</sub>/R<sub>standard</sub>) - 1) ×1000; with R=<sup>m</sup>O/<sup>16</sup>O and m = 17 or 70 18) defining a linear correlation of slope close to 1 (hereafter referred to as 1:1 CL, the 1 to 1 71 72 Correlation Line), instead of a slope 0.52 for the "classical" mass dependent isotopic fractionations 73 (MDF) known to occur during physical and chemical processes<sup>(11)</sup>. The question of the origin of the 74 1:1 CL is central to the formation of solids in the early solar system. It has been successively 75 proposed to result from: (i) the injection in the protosolar nebula (PSN) of pure <sup>16</sup>O of supernovae 76 origin<sup>(3)</sup>, (ii) a mass independent fractionation (MIF) effect analogous to those observed 77 experimentally during the synthesis of ozone<sup>(1,7)</sup>, and (iii) a self-shielding effect on the solar (or nonsolar) UV light by CO<sup>(12-14)</sup>. While the lack of presolar grains enriched in <sup>16</sup>O makes the first proposal 78 unlikely<sup>(15)</sup>, the two other ones have gained some recent theoretical<sup>(14,16)</sup> or experimental<sup>(17,18)</sup> 79 80 support. In the present paper, we address experimentally several issues raised by the ozone 81 experiment to explore whether this 1:1 CL could be due to MIFs reactions having taken place in the 82 PSN.

The formation of ozone results from a three-body reaction. However, at high temperature in a PSN dominated by H<sub>2</sub>, the low concentration of elements heavier than H mean that three-body reactions cannot play an important role in the gas phase<sup>(16)</sup>. In order to overcome this difficulty, the surfaces of growing grains were proposed as possible catalysts for the reactions leading to a MIF effect<sup>(16)</sup>. Experimental evidence of this effect were reported for SiO/O<sub>2</sub>/H<sub>2</sub> mixtures<sup>(17)</sup> but with variations of smaller magnitude than in solar system materials. The present paper is an additional test of this theoretical proposal.

#### 90 Experimental

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Because of the difficulties to carry out controlled condensation experiments in hot plasmas, our approach was not intended to mimic the conditions of the PSN but to answer specific questions having key implications for cosmochemistry. Are oxygen MIFs linked to a precise class of chemical reactions? Are they restricted to gas phase reactions or, as suggested by<sup>(18)</sup>, can they take place during condensation of solids from a gas or be transferred from the gas to condensing solids? Can

98 the conditions of the appearance of MIFs in the laboratory be reasonably extended to the conditions 99 prevailing in the PSN? To this aim, we investigated reactions involving the isotopes of the two major 100 elements constituting the telluric planets, O and Mg. The comparison between isotopic effects on 101 O and Mg will bring important constraints because, at variance with O, all Mg isotopic fractionations 102 in meteorites are considered to result from MDF processes such as evaporation, condensation and 103 diffusion<sup>(19-22)</sup>.

We have explored different reactions taking place in plasmas between gaseous species leading to the condensation of O and Mg bearing compounds. A summary of these experiments is shown in Table S1. Here we report only the results of experiments that have yielded MIF effects. The experimental protocol is comparable to that previously described for H or Ti<sup>(18, 23)</sup> and is detailed in Material and Methods.

109 In microwave plasma, the molecules are dissociated by electron impact producing highly 110 reactive radicals. The high temperature of the gas enhances the rates of chemical or isotopic 111 reactions. In addition, this type of plasma allows the condensation of enough material for isotopic 112 analyses. The aim of these plasma experiments was to produce isotopic exchanges combined with 113 chemical reactions. For oxygen isotopes we studied the reactions between Pentanol and N<sub>2</sub>O or 114 between a solution of Pentanol-MgCl<sub>2</sub> and CO<sub>2</sub>. The radical O atoms, produced by the dissociation 115 of CO<sub>2</sub> or N<sub>2</sub>O, react with their parent molecules and an isotopic exchange between O and CO<sub>2</sub> or 116 between O and N<sub>2</sub>O can take place. These isotopic exchanges are mediated by the transient 117 formation of the activated complexes [CO<sub>3</sub>]\* or [N<sub>2</sub>O<sub>2</sub>]\*. For magnesium isotopes we studied the 118 reaction between Pentanol and MgCl<sub>2</sub> for which the isotopic exchange can take place between Mg 119 and MgCl<sub>2</sub> through the transient formation of the complex [Mg<sub>2</sub>Cl<sub>2</sub>]\*. The purpose of the introduction 120 of Pentanol along with the O and Mg gaseous carriers, is to produce carbonaceous CxHy\* radicals<sup>(23,24)</sup> (dot designates radicals) that can react with the activated complexes before their 121 122 dissociation as O+CO<sub>2</sub>, O+N<sub>2</sub>O or Mq+MqCl<sub>2</sub>. The reaction of the activated complex with a 123 carbonaceous radical should lead to the retrieval of O and Mg from the gas by condensation via 124 the polymerization of organic C<sub>x</sub>H<sub>y</sub>-O or C<sub>x</sub>H<sub>y</sub>-Mg macromolecules. A MIF effect is predicted in 125 such a case, when an activated complex is involved in two chemical reactions (here dissociation or 126 reaction with  $C_x H_y^{\bullet}$  radicals) at the same time because the rate of a chemical reaction involving a 127 complex formed by identical isotopes is not the same than that of a complex formed by non-identical 128 isotopes<sup>(25)</sup>. Note that there is no scientific consensus on this interpretation<sup>(26)</sup>.

# 129 **Results** 130

The Mg and O isotope compositions were measured using NanoSIMS at the Museum National
 d'Histoire Naturelle in Paris (cf. Table S2 for instrumental setup). A selection of the data is reported

133 in Table S3 Tables and Figures. NanoSIMS analyses of the majority of the plasma deposited carbonaceous material (PDCM) exhibit small isotopic variability, on the order of 10-30%, likely due 134 135 to analytical effects caused by surface sample roughness. In the following, PDCM will refer to this 136 large fraction of condensed organic macromolecules that does not show any significant MIF effect. 137 The measured isotopic variations are thus expressed in  $\delta$  units using the average isotopic 138 compositions (for O and Mg) of the PDCM as reference values. This procedure allows to minimize 139 analytical matrix effects and to express the isotopic fractionation relative to the non-fractionated 140 compounds produced from the same gas. Analyses of terrestrial samples with no MIF (San Carlos 141 olivine and terrestrial kerogen) and of the PDCM show an external reproducibility (measured in a 10  $\mu$ m<sup>2</sup> area) of ±≈20‰ (2 $\sigma$ ) for  $\delta^{25-26}$ Mg and ±≈30‰ (2 $\sigma$ ) for  $\delta^{17-18}$ O (cf. Table S3.1, Figure S3.1 142 143 and Table S3.3 Figure S3.3).

144 The Mg and O isotopic results (Figures 1 and 2 constructed from Tables S3.2, S3.4 and S3.5) 145 show four major features. (i) Large MIFs distributing along a line of slope close to 1 are observed 146 both for O and Mg in the experimental condensates. For Mg (Figure 1a) the observed slope 147 (1.127±0.034) is close to the calculated one (0.98 if mass dependent effects are ignored cf. S4) 148 using the model developed for MIF in ozone<sup>(18,25)</sup>. Similarly, for O, the observed slopes (1.086 149  $\pm 0.048$  for  $\delta^{17,18}$ O<0‰ and 1.066 $\pm 0.079$  for  $\delta^{17,18}$ O>0‰, ignoring data with  $\delta^{18}$ O>250‰) are close 150 to the calculated one (1.00). Note that no free parameter is involved in the calculation of these 151 slopes. (ii) MIFs appear specific to chemical reactions. In Figure 2a, the negative  $\delta^{17}O-\delta^{18}O$  data 152 correspond to the oxidation of Pentanol by N<sub>2</sub>O (see also Figure S5), while the positive ones 153 correspond to the oxidation of the Pentanol/MgCl<sub>2</sub> solution by CO<sub>2</sub>. In the Pentanol/MgCl<sub>2</sub>/CO<sub>2</sub> 154 experiment, one area on the Si wafer shows variations distributed along a slope ≈0.5 but with an enormous range of variations in  $\delta^{18}$ O (from  $\approx$ +700 to  $\approx$  +1500‰; Figure 2a) impossible to explain 155 156 by a "classical MDF" (iii) Oxygen isotopic variations along the 1:1 CL are not correlated to the <sup>16</sup>O 157 concentration (i.e. to the ion count rate; cf. Table S3.5), so that they cannot be explained by mixing 158 between 2 components but requires instead variations in the magnitude of the MIF factor producing 159 multiple end-members. (iv) At the scale of 200-500 nm, MIFs are not systematically associated with 160 elemental O hotspots, i.e. with an increase in the ionic emissivity of O compared to that from the 161 amorphous PDCM where no MIF effect is observed. Note that, in the case of the Pentanol/N<sub>2</sub>O 162 experiment, no hotspot in emissivity was observed at the location of negative MIF effects.

As reported in Figure 1 in the case of the Pentanol/MgCl<sub>2</sub> experiments, isotopic Mg hotspots were clearly associated with the rim of carbonaceous grains (cf.<sup>(27)</sup> for the formation of nanoparticles from plasma). As observed for Ti isotopes<sup>(18)</sup>, the Mg MIF effect varies within the grains in such a way that the isotopic mass balance is achieved at the scale of the bulk grain. For experiments involving oxygen isotopes, the morphology of the grains carrying the MIF effect could not be determined and it cannot be excluded that the MIF carriers are part of the molecular structure ofthe PDCM.

#### 170 171

# 172 Discussion173

174 Several theoretical origins of the MIF effect (i.e. the origin of the MIF factor noted  $\eta$ ) have been 175 proposed<sup>(26, 28-30)</sup>. Here we take for granted that the MIF effect appears when the activated complex 176 responsible for the isotopic exchange is involved in a chemical reaction<sup>(6,16,25)</sup>.

177 For the CO<sub>2</sub>/MqCl<sub>2</sub>/Pentanol experiment, the complex is likely  $[CO_3]^{*(31)}$ . Because (i) no oxygen 178 MIF effect is observed in the Penthanol/CO<sub>2</sub> experiment (cf. Table S1) and because (ii) at the location of oxygen MIF, chlorine is observed by SEM as ≈200 nm spots while Mg is absent, the MIF 179 180 effect is attributed to the reaction of  $[CO_3]^*$  with an organochlorine radical  $(C_xH_y-CI)^*$ . The complex 181  $[CO_3]^*$  can either decompose and return to the gas (Channel 1 of the following reaction 1) or be 182 stabilized (Channel 2) as (CxHv-CIO). In this model both Channels lead to a MIF effect with 183 fractionation opposite in sign, but only the isotopic effect in the condensed phase can be preserved 184 in the reaction products since isotopic re-equilibration will take place in the gas.

Reaction 1.

The lack of measurable MIF effects in the PDCM indicates that  $C_xH_y$ -O can also directly condense without reacting with the complex [CO<sub>3</sub>]\*. We thus now distinguish between two types of condensation: a complex-mediated condensation and a direct condensation (i.e. a two-body reaction). A similar scheme can be proposed to explain the Penthanol/N<sub>2</sub>O experiment where the complex would be [N<sub>2</sub>O<sub>2</sub>]\*.

The present experimental observations can be tentatively extended to the origin of oxygen isotopic variations in the PSN. A possible scenario - alternative to the self-shielding ones<sup>(12-14)</sup> - can be proposed (Reaction 2; Figures. 3a, b):

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#### Reaction 2

195 In this scenario, E is a chemical element (E = Si, Al, Mg, Ca etc..) forming an oxide EO that 196 condenses from the gas phase. OAds and EOAds correspond to species adsorbed at the surface of 197 a solid (subscript Ads in Reaction 2) during its condensation, so that the formation rate of [EO-O]Ads\* is enhanced by many orders of magnitude relative to the rate in gas phase reaction. Note 198 199 that, contrary to the self-shielding model, the dissociation of H<sub>2</sub>O<sub>Gas</sub> or CO<sub>Gas</sub> does not produce MIF 200 fractionationed oxygen atoms (O<sub>Gas</sub>). The oxygen isotope exchange takes place in [EO-O] Ads\* and 201 produce the MIF effect during its decomposition. The Channel 1 corresponds to the stabilization of 202 a fraction of the complex [EO-O] Ads\* in the solid (subscript Sol) by unknown reactions. The dashed

203 arrows for the Channel 2 indicate that the other fraction of the complex [EO-O] Ads\* can be either 204 incorporated in the solid (Channel 2a) as observed here for Mg and for Ti<sup>(32)</sup> isotopes or can 205 spontaneously dissociate to the gas phase. (Channel 2b). The O returned to the gas by this 206 destabilization of a fraction of the complex, re-equilibrates isotopically with the major oxygen 207 bearing molecules of the PSN (H<sub>2</sub>O and CO). The magnitude and the sign of MIF in the two fractions 208 of the complex stabilized in the solid are expected to depend on the type of chemical reaction taking 209 place, as observed in the present experiments with oxidation of pentanol by either N<sub>2</sub>O or CO<sub>2</sub> 210 producing either <sup>16</sup>O excess or <sup>16</sup>O depletion, respectively (Figure 2). In other words, in the PSN, if 211 this process occurs, then different oxides should fractionate differently oxygen isotopes but, 212 possibly in a mass independent manner.

213 This catalytic property of grain surfaces for enhancing the rate of reaction between adsorbed 214 species, overcomes one of the major difficulties for having MIF effects in the PSN. Indeed, in the 215 PSN, in a large excess of H<sub>2</sub>, the O atoms produced by the photodissociation of H<sub>2</sub>O or CO<sup>(33)</sup> are 216 likely to react with H<sub>2</sub> to form OH + H much faster than being involved in a gaseous three body reaction similar to that which leads to ozone<sup>(16)</sup>. However, the chemical nature of the adsorbed 217 218 activated complex taking part to condensation reactions in the PSN is, at this stage, impossible to 219 predict. This is exemplified by the fact that no MIF is observed in meteorites for Mg, while large 220 MIFs are produced in our experiments. This may indicate that the possible activated complexes 221 involving two Mg atoms are unstable (such as [Mg<sub>2</sub>O]<sup>\*</sup>) in the chemical conditions that prevailed 222 during the condensation of Mg-rich silicates (forsterite could for instance form by direct 223 condensation and not by a complex-mediated condensation).

Thus, assuming that the gas from which the first oxides and silicates condense in the PSN has the isotopic composition measured for the Solar wind  $(\delta^{17}O \approx \delta^{18}O \approx -60\%)^{(4,5)}$ , only the grains condensed by a complex-mediated condensation would develop MIF effects with  $\delta^{17}O \approx \delta^{18}O$  either >  $-60\%^{(34)}$  or  $<-60\%^{(35,36)}$ . All the other condensates, formed by direct condensation, would have the oxygen isotopic composition of the PSN (Figure 3b). Note however that, due to mass balance effects, a gaseous reservoir previously fractionated by complex-mediated condensation could produce, by direct condensation, solids with MIF effects.

The simultaneous occurrence of these two types of condensation reactions, having different consequences as far as oxygen isotopes are concerned, may account for part of the large diversity of isotopic compositions observed in CAIs and chondrules from primitive meteorites<sup>(34)</sup>. Note however that the large  $\delta^{17}O \approx \delta^{18}O$  variations observed in the present experiments (several hundreds of ‰) compared with the much smaller enrichments in <sup>17,18</sup>O relative to the Sun observed in most solar system solids (50-70‰) implies that their oxygen isotopic composition contains only a small MIF contribution. As postulated in the Reaction 2 and observed during the formation of  $SiO_2^{(17)}$ , complexes<sup>(37)</sup> resulting from the dissociation of H<sub>2</sub>O could be responsible for the extreme <sup>16</sup>O depletion ( $\delta^{17,18}O$ (‰) up to +180‰) observed<sup>(38)</sup> in some rare minerals whose synthesis involves the reaction between Fe (or FeS) and H<sub>2</sub>O<sup>(38)</sup> (cf. Figure3b).

Although the self-shielding model remains a viable possibility in the PSN to produce reservoirs variously depleted or enriched in <sup>16</sup>O<sup>(12, 13)</sup>, the presently proposed MIF constitutes an additional potential source of <sup>16</sup>O enrichments and depletion. This scenario is testable in laboratory through dedicated experiments of high temperature oxide condensation.

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250 Materials and Methods251

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# 253 <u>1- Experimental protocol.</u>

255 All experiments (cf. the schematic drawing in Figure 4) were performed in a glass line where the 256 pressure reaches 10<sup>-4</sup> Torr. A gas vector (N<sub>2</sub> for the Mg experiment and N<sub>2</sub>O or CO<sub>2</sub> for the oxygen 257 experiments) is injected into the line and passes through a cylinder glass tube ( $\emptyset = 1 \text{ cm}, I = 10 \text{ cm}$ ) 258 where the pressure is maintained at  $\approx 1$  Torr by dynamical pumping. Glass reservoirs containing 259 organic liquids (Pentanol or MqCl<sub>2</sub> dissolved in Pentanol) were connected to the line by stopcocks. 260 The vapor pressure of the liquids was injected in the gas vector by adjusting the leak of these 261 stopcocks. The gas to organic pressure ratio was of the order of 1:1. The characteristic lifetime of 262 the gas in the tube was 1/10 sec. The plasma was produced in the center of the glass tube by an 263 HF discharge at 2450 MHz. In such conditions, the molecular temperature is estimated to be around 264 1000K. The plasma is not thermal i.e. the temperature of the electrons is higher than that of the 265 molecules.

Silicon wafers were deposited 5 cm downhill from the discharge. Carbonaceous matter was deposited on the glass walls around the discharge and on the silicon wafers. It was mechanically collected as a powder for isotopic analyses. The molecular organic structure of this carbonaceous matter is described elsewhere<sup>(39)</sup>. Except for experiments involving N<sub>2</sub>O, MIF effects were found on the wafers. Except for Mg, no structural grain corresponding to the size and distribution of isotopic hotspots was identified by SEM.

We report in this paper only experiments where MIF effects were identified (other experiments are listed in Table S1). It should be kept in mind that MIF-bearing grains are rare in the organic matter (named PDCM for Plasma Deposited Carbonaceous Matter for the organic matter with no significant MIF). So, the fact that no MIF region was observed in these samples is not definitive proof that they are absent.

#### 277 <u>2. Analytical protocol.</u>

The Mg and O isotope compositions were measured using NanoSIMS at the Museum National d'Histoire Naturelle in Paris. The isotopic compositions of individual grains ( $\emptyset$  0.5 to 2 µm) were analyzed by image analysis using the *l'Image* software package (L. Nittler, Carnegie Institution of Washington, Washington, DC). For NanoSIMS analyses, carbonaceous powder collected on the glass walls (region 4 in Figure 4) were pressed on gold, gold coated and mounted on 1 inch holders. Silicon wafers are gold coated without any further preparation. The instrumental parameters of the NanoSims are reported in Table S2. 285 In order to have comparable topographic and matrix effects for the isotopic reference and for 286 the samples, all data are reported using the PDCM as the reference value. In others terms, the 287 isotopic fractionation is expressed relative to the carbonaceous deposits that do not show MIF 288 effects in excess of  $\approx \pm 2\sigma$  relative to their average value. When analyses were performed randomly, 289 each area ( $\approx 20 \times 20 \ \mu\text{m}$ ) was divided in 9 regions (i.e. ROI  $\approx 6 \times 6 \ \mu\text{m}$ ; noted "Random Area" in 290 Tables S3.3 and S3.5). Data reported in Tables S3.2, 3.4, and 3.5 are used to construct the Figures 291 in the text. Two examples of the distribution of the Mg and O data recorded on the PDCM are shown 292 in Figures S3.1 and S3.3.

Analyses on terrestrial kerogen powders give reproducibility of ±37 and ±23 on  $\delta^{17}O$  (‰) and  $\delta^{18}O$  (‰), respectively (2 $\sigma$ ), similar to those measured for the PDCM. Under the same conditions, the reproducibility on the polished San Carlos olivine standard is  $\approx \pm 5$  and  $\approx \pm 8$  on  $\delta^{17}O$  (‰) and  $\delta^{18}O$  (‰), respectively. The poor reproducibility on the PDCM is caused by the topography of the organic powder pressed in gold, bearing in mind that the presence of non-detected MIF bearing grains cannot be totally excluded.

For magnesium, a synthetic sample (Methylmagnesium chloride evaporated in the air) was used to verify the MDF relations between the electron multipliers. For oxygen, these relations are checked routinely for rock sample analyses.

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303

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411

#### 412 Figure Legends

**Figure 1**: (a) Magnesium isotopic compositions of Mg-bearing carbonaceous grains reported as  $\delta^{25}$ Mg vs.  $\delta^{26}$ Mg variations relative to the PDCM (0:0 ±≈20‰). Data were collected in 4 grains either as surface or volume variations (cf. Table S3.2). Error bars include statistical errors (ion counting statistic) and the reproducibility on the standard (±2 $\sigma$ ). The 1:1 dashed line is drawn for reference but does not stand for the best fit line to the data.

418 (b)  $\delta^{26}$ Mg and  $\delta^{25}$ Mg variations of the rim of the 5 µm size grain shown in Figure1c are reported 419 as a function of the analytical sputtering time expressed in sec (data also reported in Figure 1a). 420 The total sputtering duration (6600 sec) indicates that the rim of the grain is ≈200 nm thick. The 421 PDCM ( $\delta^{26}$ Mg ≈  $\delta^{25}$ Mg ≈0‰) embedding the grain reappears after complete sputtering. Note the 422 two-outlier data (which are not analytical errors) observed during the flipping from negative to 423 positive  $\delta$  values (also obvious in Figure 1a). Cf. sample *Robert-Juillet-2019\_23.im* in Table S3.2.

424 (c) lonic image of the distribution of  $\delta^{26}$ Mg shown in Figure 1b. This image is made by the 425 summation of the 3 scans collected between 3600 and 4800 sec (cf. Figure 1b). The core of the 426 grain (in blue) has a homogeneous isotopic composition ( $\delta^{26}$ Mg $\approx\delta^{25}$ Mg $\approx0$ %) while the rim exhibits 427 marked enrichments in <sup>26</sup>Mg (<sup>25</sup>Mg not reported here) localized in spots that do not exceed 200 nm 428 in size. The PDCM where the  $\delta^{25}$ Mg and  $\delta^{26}$ Mg cannot be defined because of the too low counting 429 rates on <sup>25</sup>Mg and <sup>26</sup>Mg appears in black.

(d) SEM image of another Mg-bearing carbonaceous grains (not analyzed for isotopic analyses)
deposited on the silicon wafers. The structure suggests that the extreme isotopic variations
observed in the grain shown in (c) are concentrated in the fine-grained rim.

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435 Figure 2: Figure 2a: Oxygen isotopic compositions of grains embedded in the PDCM are 436 reported as  $\delta^{17}$ O vs.  $\delta^{18}$ O. The  $\delta$  variations are expressed relative to PDCM (0-0‰ ±  $\approx$ 30‰; 2 $\sigma$ ). 437 Error bars include statistical errors (ion counting statistic) and the reproducibility on the standard 438  $(\pm 2\sigma)$ . Open diamonds stand for the oxidation of Pentanol by N<sub>2</sub>O. Open and black dots stand for 439 the oxidation of the MgCl<sub>2</sub>/Pentanol solution by CO<sub>2</sub> (open dots for grains concentrated in the same 440 100×100 μm area and defining a slope≈0.5). The 1:1 dashed line is drawn for reference, not for 441 the best fit line. The correlation defined by the black dots does not intercept at 0-0%; this can be 442 an analytical matrix effect or a MDF contribution to the MIF effect.

Figure 2b: NanoSims ion image ( $20 \times 20 \mu$ m; sample *Robert-Juillet-2020\_9* in Table S3.5) showing four hotspots in oxygen intensities where MIF compositions were measured and reported in Figure S6 (PDCM in black). The measured  $\delta^{17}$ O are reported on the figure for 3 of the 4 hotspots. In order to increase the contrast of the image the colors vary according to the logarithmic intensity of the count rate (Cps for counts/sec).

448 Figure 2c. NanoSims ion image (20×20  $\mu$ m; sample *Robert-Juillet-2020\_18* in Table S3.5) 449 showing isotopic hotspots on Si wafer (in  $\delta^{18}O(\%)$  units).

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**Figure 3:** (a)  $\delta^{17}$ O *vs.*  $\delta^{18}$ O diagram for the solar system. Selection of observational constraints. The MDF line (slope 0.52) is shown for the Earth-Moon system (dashed line). Minerals from refractory inclusions (CAIs), ameboid olivine aggregates (AOAs) and chondrules in carbonaceous chondrites define the 1:1 CL. Sun:  $\delta^{17,18}$ O  $\approx$  -60‰<sup>(5)</sup>. Some rare CAIs, relict CAIs in chondrules and 455 chondrule from CH-CB chondrites are enriched in <sup>16</sup>O relative to the Sun<sup>(35,36)</sup>. Extreme <sup>16</sup>O 456 depletion was observed in the C3-Acfer 094 meteorite<sup>(38)</sup>. Most meteorites (Chondrites H, L and 457 LL), the Earth, Moon and Mars have bulk  $\delta^{17,18}$ O values around 0±10‰.

458 (b) Qualitative interpretation of (a). The PSN gas has the oxygen isotopic composition of the 459 Sun:  $\delta^{17,18}$ O $\approx$  -60‰. The position of the grains on the 1:1 line is, at first order, dictated by the chemical reaction responsible for the complex-mediated condensation of oxides and silicates 460 461 (noted [EO<sub>2</sub>]\* with E designating Si, Mg, Al etc.). Oxides would exhibit either <sup>16</sup>O depletion or enrichment relative to the Sun. The extreme <sup>16</sup>O depletion observed in the C3-Acfer 094 meteorite 462 could result from a reaction involving one of the [O-H<sub>x</sub>O]\* complexes resulting from the dissociation 463 464 of H<sub>2</sub>O<sup>(37)</sup>. Condensation taking place without going through an activated complex (noted direct 465 condensation) should yield grains having the oxygen isotopic composition of the ambient gas, 466 which can be different from the Sun if this gas was previously fractionated by complex-mediated 467 condensation.

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Figure 4: (1) gas vector (N<sub>2</sub> or N<sub>2</sub>O or CO<sub>2</sub>) (2) reservoir of organic liquids (Pentanol or Pentanol MgCl<sub>2</sub>) (3) leak of (2) in (1) (4) Microwave cavity (5) Silicon Wafer. Organic deposits are present on
 the glass walls of region 4 and on the Wafer.

#### 472 Reaction Legends

473 **Reaction 1**: Possible reaction at the origin of the oxygen MIF effect observed in the CO<sub>2</sub>/MgCl<sub>2</sub>/Pentanol plasma experiment.

475 **Reaction 2**: Proposed chemical scheme at the origin of the mass independent oxygen isotopic
 476 reaction observed in solar system materials.

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## Oxygen and Magnesium Mass Independent Isotopic Fractionation Induced by Chemical Reactions in Plasma

## Supplementary Materials

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#### S1: MIF effects in different experiments.

Е	Chemical compounds	nds Inorganic E Organic E (hetero-element)		Chemical reactant	Grains <sup>(3)</sup>	Hotspots <sup>(4)</sup>	MIF
Mg	Magnesium dichloride in Pentanol	$MgCl_2$		$C_5H_{11}OH$ / $N_2$	Yes	Yes	Yes
Mg	Methylmagnesium chloride in $\mathrm{THF}^{(1)}$		$CH_3MgCl$	$N_2$	No	No	No
Mg	Methylmagnesium chloride in $\mathrm{THF}^{(1)}$	$N_2O$	$CH_3MgCl$		No	No	No
0	Pentanol	$N_2O$		$C_5H_{11}OH$	No	No	Yes
0	$Triacetoxy(vinyl)silane^{(2)}$		$(\mathrm{CH}_3\mathrm{CO}_2)_{\!\!3}\mathrm{SiCH}$ - $\mathrm{CH}_2$	$N_2$	No	No	No
0	$Triacetoxy(vinyl)silane^{(2)}$	$N_2O$	(CH <sub>3</sub> CO <sub>2</sub> ) <sub>3</sub> SiCH - CH <sub>2</sub>		No	No	No
0	Magnesium dichloride in Pentanol	$N_2O$		MgCl <sub>2</sub> / C <sub>5</sub> H <sub>11</sub> OH	Yes	Yes	No
0	Magnesium dichloride in Pentanol	$CO_2$		$MgCl_2 / C_5H_{11}OH$	Yes	Yes	Yes

Notes: (1) Tetrahydrofuran. (2) Si has 3 oxygen bonds. (3) Optical grains on the silicon wafer (4) hospots designate an increase in the ionic intensity i.e. in a change in the ionic emissivity caused by a different chemical speciation of oxygen. These hotpots are revealed by the ion imaging mode of the NanoSims.

<u>Table S1</u>: The first column designates the element E (Mg or O) for which the isotopic compositions have been measured. In the last 3 columns, "Yes" indicates that grains (optical microscopy), hospots (NanoSims) or MIF were observed. No MIF effect was detected for Mg when using an organic bonded Mg-Cl instead of MgCl<sub>2</sub> in solution with Pentanol. MIF effects on O were observed for Pentanol or Pentanol/MgCl<sub>2</sub> in presence of N<sub>2</sub>O and CO<sub>2</sub>, respectively but not with Pentanol/MgCl<sub>2</sub> in presence of N<sub>2</sub>O. No MIF effect was detected for O when using organic bonded O atoms. Optical grains are not systematically associated with MIF effects.

#### S2. NanoSims analytical protocols

	Magnesium	Oxygen	Oxygen
Session	March 2020	Nov. 2018	July 2020
Primary current	0	Cs <sup>+</sup>	Cs <sup>+</sup>
Beam Current (pA)	13	650	1.8
Diameter Aperture	D1-2	D1-1	D1-3
Presputtering time (min)	5	2	5
Presputtering current (pA)	2000	1500	180
Secondary currents	Mg+	0-	0-
Eletron multipliers	<sup>24,25,26</sup> Mg <sup>+</sup>	<sup>17,18</sup> 0 <sup>-</sup>	<sup>16,17,18</sup> O <sup>-</sup>
Faraday cup		<sup>16</sup> 0 <sup>-</sup>	
Rastering	20x20 µm	No Image	20x20 μm
Pixels	256 x 256		256 x 256
Dwell time (ms/pixel)	1000		1000
Mass resolution	8000	8500	8000
Entrance slit	ES3	ES3	ES3
Aperure slit	AS2	AS3	AS2
Dead Time	44 ns	44 ns	44 ns
Reference for $\delta$ units	PDCM	PDCM	PDCM

Table S2: The instrumental parameters of the NanoSIMS.

	EM on 24Mg, 25Mg and 26Mg		25Mg/24Mg Re	ference Std value	1.234E-01								
	MgCl2 in Pentanol / N2		26Mg/24Mg Re	ference Std value	1.371E-01								
	Sample	Commonte		24Ма	24Ma	2534.0	2534.0	2634.0	26Ма	Dolto 26Mg	$\pm (2 \text{ etd } \text{day})$	Dalta 25Mg	$\pm (2 \text{ etd } \text{dec})$
Olivine San Carlos - Used as	a standard · Dolta 17 18 = 0 %	Comments		Tot	cos	Tot	cos	Tot	cos	Senta 20Mg	- ( 2 stu.uev)	Sena 25Mg	* ( 2 studev)
Restering (2x2)	sple@l l	Polished Sample	Randoom Area 1	1 15E+07	1 12E+05	1.43E+06	1 40E+04	1 57E+06	1 54E+04	-2.3	1.6	8.9	1.7
Rastering (2x2)	spic@1_1	Polished Sample	Randoom Area 2	1.07E+07	1.05E+05	1.34E+06	1.31E+04	1.47E+06	1.43E+04	-4.5	1.0	8.8	1.7
Rastering (2x2)	spice 1_2	Polished Sample	Randoom Area 2	1.10E+07	1.09E±05	1.37E±06	1.34E±04	1.51E+06	1.47E+04	2.0	1.6	0.0	1.7
Rastering (2x2)	sple@1_5	Polished Sample	Randoom Area 4	1.11E+07	1.09E+05	1.39E+06	1.34E+04	1.57E+06	1.47E+04	-4.5	1.6	9.8	1.7
Rastering (2x2)	spic@1_4	Polished Sample	Randoom Area 5	1.11E+07	1.09E±05	1.37E+06	1.34E±04	1.51E+06	1.47E+04	6.9	1.6	7.5	1.7
Rastering (2x2)	sple@1_5	Polished Sample	Randoom Area 6	1.08E+07	1.06E+05	1.35E+06	1.34E+04	1.48E+06	1.44E+04	-3.6	1.6	10.6	1.7
Rastering (2x2)	spic@1_0	Polished Sample	Randoom Area 7	1.11E±07	1.00E±05	1.39E±06	1.35E±04	1.52E±06	1.49E±04	2.0	1.6	97	1.7
Rastering (2x2)	sple@1_7	Polished Sample	Randoom Area 8	1.12E+07	1.10E+05	1.40E+06	1.36E+04	1.52E+06	1.49E+04	-7.7	1.6	5.9	1.7
Rastering (2x2)	spic@1_0	Polished Sample	Randoom Area 0	1.00E±07	1.06E±05	1.35E+06	1.302-04	1.47E±06	1.44E+04	0.2	1.6	8.4	1.7
Rastering (2x2)	spic@1_9	Polished Sample	Randoom Area 10	1.12E+07	1.00E+05	1.30E+06	1.32E+04	1.52E±06	1.49E+04	-9.5	1.6	5.2	1.7
Rastering (2x2)	Robert hullet 2010 1	Polished Sample	Randoom Area 1	2 22E+06	1.11E+04	2.81E+05	1.40E±02	2.12E+05	1.46E+02	27.4	2.6	25.1	2.9
Rastering (2x2)	Robert-Juillet 2019_1	Polished Sample	Randoom Area 2	2.221.100	1.12E+04	2.811.05	1.401.103	2.16E+05	1.58E+02	10.9	3.6	24.3	3.0
Rastering (2x2)	Robert-Juillet 2019_2	Polished Sample	Randoom Area 2	6.61E±06	2 20E+04	2.30E+05	4.11E±02	9.00E+05	4.50E+03	6.2	2.1	7.4	2.2
Rastering (2x2)	Robert Juillet 2019_5	Polished Sample	Randoom Area 4	6.26E+06	2 12E+04	7.79E±05	2 80E±02	9.00E+05	4.362+03	-0.2	2.1	7.4	2.2
(LAL)	Robert Sumer 2015_4	ronsilee builiple	rundoom / neu 4	0.201.00	5.1512.04	1.101.00	5.671.05	0.010.00	4.252.05		2.2	7.4	2.0
PDCM (used as a standard)	Sample			24Mg	25Mg	26Mg	24Mg	25Mg	26Mg	Delta 26Mg	±(2 std.dev)	Delta 25Mg	±(2 std.dev)
FR20				cps	cps	cps	Tot.	Tot.	Tot.	%•	%	‰	%•
Rastering (25x25)	Robert-April-2019 3.im	Hot-Spot 1 in Powder	Image 3	1.11E+04	1.37E+03	1.53E+03	3.32E+05	4.10E+04	4.57E+04	6.0	9.4	2.9	9.9
Rastering (25x25)	Robert-April-2019_4.im	Hot-Spot 1 in Powder	Image 4	4.55E+04	5.60E+03	6.16E+03	7.42E+05	9.14E+04	1.01E+05	-11.3	6.3	-1.8	6.6
Rastering (25x25)	Robert-April-2019 4.im	Hot-Spot 2 in Powder	Image 4	3.61E+04	4.50E+03	4.94E+03	3.07E+05	3.83E+04	4.20E+04	-1.5	9.8	11.4	10.2
Rastering (25x25)	Robert-April-2019_4.im	Hot-Spot 3 in Powder	Image 4	3.20E+04	3.97E+03	4.41E+03	2.80E+05	3.47E+04	3.85E+04	4.7	10.2	5.7	10.7
Rastering (25x25)	Robert-April-2019 4.im	Hot-Spot 4 in Powder	Image 4	2.54E+04	3.16E+03	3.44E+03	1.83E+05	2.27E+04	2.47E+04	-13.6	12.7	7.3	13.3
Rastering (25x25)	Robert-April-2019 4.im	Hot-Spot 5 in Powder	Image 4	1.55E+04	1.92E+03	2.11E+03	1.67E+05	2.08E+04	2.28E+04	-4.9	13.2	7.3	13.9
Rastering (25x25)	Robert-April-2019 5 mod.im	Hot-Spot 1 in Powder	Image 5	1.13E+05	1.40E+04	1.54E+04	1.78E+06	2.19E+05	2.41E+05	-12.5	4.1	-2.0	4.3
Rastering (25x25)	Robert-April-2019 6.im	Hot-Spot 1 in Powder	Image 6	1.13E+05	1.40E+04	1.54E+04	1.87E+06	2.31E+05	2.54E+05	-8.0	4.0	1.2	4.2
Rastering (25x25)	Robert-April-2019_6.im	Hot-Spot 2 in Powder	Image 6	6.98E+04	8.56E+03	9.50E+03	4.85E+05	5.95E+04	6.60E+04	-7.4	7.8	-6.3	8.2
Rastering (25x25)	Robert-April-2019 6.im	Hot-Spot 3 in Powder	Image 6	8.04E+04	9.87E+03	1.08E+04	1.51E+06	1.86E+05	2.03E+05	-21.2	4.4	-4.6	4.6
Rastering (25x25)	Robert-April-2019_7_mod.im	Hot-Spot 1 in Powder	Image 7	7.09E+04	8.70E+03	9.63E+03	1.99E+06	2.44E+05	2.70E+05	-9.8	3.8	-5.4	4.0
Rastering (25x25)	Robert-April-2019 7 mod.im	Hot-Spot 2 in Powder	Image 7	6.85E+04	8.38E+03	9.31E+03	8.59E+05	1.05E+05	1.17E+05	-8.5	5.9	-8.5	6.2
Rastering (25x25)	Robert-April-2019_7_mod.im	Hot-Spot 3 in Powder	Image 7	1.20E+05	1.46E+04	1.61E+04	2.86E+06	3.49E+05	3.84E+05	-21.8	3.2	-12.1	3.4
Rastering (25x25)	Robert-April-2019 7 mod.im	Hot-Spot 7 in Powder	Image 7	8.27E+04	1.01E+04	1.13E+04	1.13E+06	1.38E+05	1.55E+05	-4.1	5.1	-8.7	5.4
Rastering (25x25)	Robert-April-2019_7_mod.im	Hot-Spot 8 in Powder	Image 7	8.88E+04	1.08E+04	1.19E+04	2.32E+06	2.84E+05	3.12E+05	-20.7	3.6	-9.8	3.8
Rastering (25x25)	Robert-April-2019 8.im	Hot-Spot 1 on Si-Wafer	Image 8	6.19E+04	7.52E+03	8.41E+03	1.35E+06	1.64E+05	1.83E+05	-9.4	4.7	-15.9	4.9
Rastering (25x25)	Robert-April-2019_9.im	Hot-Spot 1 on Si-Wafer	Image 9	1.59E+05	1.97E+04	2.21E+04	1.44E+07	1.78E+06	2.00E+06	14.9	1.4	4.0	1.5
Rastering (25x25)	Robert-April-2019_11.im	Hot-Spot 1 on Si-Wafer	Image 11	3.39E+04	4.20E+03	4.64E+03	3.16E+06	3.91E+05	4.33E+05	-1.6	3.0	2.9	3.2
Rastering (25x25)	Robert-April-2019_11.im	Hot-Spot 2 on Si-Wafer	Image 11	1.99E+04	2.47E+03	2.75E+03	2.07E+06	2.56E+05	2.85E+05	5.8	3.7	4.3	3.9
Rastering (25x25)	Robert-April-2019_11.im	Hot-Spot 3 on Si-Wafer	Image 11	1.91E+04	2.38E+03	2.63E+03	2.74E+06	3.42E+05	3.78E+05	6.2	3.3	12.8	3.4
Pactaring (25x25)	Robert April 2010, 11 im	Hot Spot 4 on Si Wafer	Imaga 11	8 26E±02	1.02E±02	1 12E+02	1.778+05	2 185+04	2 205+04	12.1	12.0	1.2	12.5

<u>Table S3.1</u>: Magnesium isotopic composition expressed as  $\delta^{25}$ Mg(‰) and  $\delta^{26}$ Mg(‰).The ionic counting rates are expressed in counts per second (cps) while the total number of counts (Tot) depend on the duration of the measurement. The average value of the PDCM is used as the *Reference Std. value* for calculating the  $\delta$  values of the hotspots exhibiting marked departure in their isotopic composition. The ionic ratios <sup>25</sup>Mg/<sup>24</sup>Mg and <sup>26</sup>Mg/<sup>24</sup>Mg used to calculate the  $\delta$  values are indicated as *Reference Std value*. Error bars are the statistical precision calculated on the total number of counts (±2 $\sigma$ ). Two examples of the statistical distribution of the data is shown for (1) an olivine sample (San Carlos) and (2) 1 region of the sample obtained in the MgCl<sub>2</sub> - Pentanol - N<sub>2</sub> experiment (noted PDCM) showing a statistical distribution of isotopic distribution is reported in Figure S3.1 bellow.

#### <u>S3.1</u>



<u>Figure S3.1</u>: An example of the distribution of data recorded randomly on the PDCM is shown as  $\delta^{25}$ Mg (‰). The reproducibility on this set of data is 15.6 and ±19.8 (2 $\sigma$ ) for  $\delta^{25}$ Mg (‰) and  $\delta^{26}$ Mg (‰), respectively. Error bars stand for the statistical analytical error.

#### Table S3.2:

25Mg/24Mg PDCM used as a reference 1 2245-01

	26Ma/24Ma DDCM used as a referen												
	26Wig/24Wig PDCM used as a reference 1.3/1E-01												
	Sample	Comments		24Mg	24Mg	25Mg	25Mg	26Mg	26Mg	Delta 26	2 sigma	Delta 25	2 sigma
FR20 - Individual grain	on upstream Si Wafer			Tot.	cps	Tot.	cps	Tot.	cps	%	±	%0	±
Destering (25-25)	Balant Ivillat 2010, 21 im	Surface 3D	Jana 21	6 475 -06	0.545.03	7.355.05	1.075.03	0.145.05	1 205 (02	02.2		02.5	
Rastering (25x25)	Robert-Juliet-2019_21.im	Surface - 2D	Image 21	0.472+08	9.346+02	7.232+05	1.072+02	8.14E+U5	1.200+02	-65.5	2.5	-92.5	2.2
Rastering (25x25)	Robert-Juliet-2019_21.im	Surface to core 2D	Image 21	1.375+07	1.205.05	1.082+06	1.605+04	1.186+06	1.745+04	5.1	1.9	21.5	1.0
Rastering (25x25)	Robert-Jullet-2019_21.Im	Surface to core 2D	Image 21	1.276+07	2.265+05	1.000+00	2.845+04	1.740+00	2.085.04	-4.5	1.0	10.5	1.5
Rastering (25x25)	Robert-Juliet-2019_21.im	Surface to core 2D	Image 21	1.100+07	2.200+05	1.402+00	2.646704	1.366+06	5.06E+04	-0.4	1.7	19.6	1.0
Rastering (25x25)	Robert-Juliet-2019_21.im	Surface to core 2D	Image 21	1.616+07	3.222+05	1.105.06	4.032704	2.466+06	4.40E+04	-5.7	1.5	17.0	1.5
Rastering (25x25)	Robert-Juliet-2019_21.im	Surface to core 2D	Image 21	6.76E+00	3.822+03	1.102+06	4.602704	1.202+06	3.210+04	-5.6	1.9	19.4	1.0
Rastering (25x25)	Robert-Julliet-2019_21.lm	Core -2D	image 21	6.66E+07	9.25E+U3	8.29E+U6	1.15E+U3	9.03E+06	1.25E+03	-11.6	0.7	8.4	0.7
Rastering (25x25)	Robert-Juillet-2019_21.im	Surface - 3D	Image 21	2.20E+06	3.54E+03	2.65E+05	4.27E+02	2.93E+05	4.71E+02	-30.2	3.7	-23.2	3.9
Rastering (25x25)	Robert-Juillet-2019_21.im	From Surface to Depth -3D	Image 21	1.50E+06	2.41E+03	1.81E+05	2.91E+02	2.02E+05	3.24E+02	-20.1	4.5	-23.5	4.7
Rastering (25x25)	Robert-Juillet-2019_21.im	From Surface to Depth- 3D	Image 21	1.25E+06	2.02E+03	1.49E+05	2.39E+02	1.67E+05	2.68E+02	-30.1	4.9	-37.8	5.2
Rastering (25x25)	Robert-Juillet-2019_21.im	From Surface to Depth- 3D	Image 21	6.70E+05	1.08E+03	7.61E+04	1.22E+02	8.55E+04	1.38E+02	-68.3	6.8	-79.4	7.3
Rastering (25x25)	Robert-Juillet-2019_21.im	From Surface to Depth- 3D	Image 21	5.23E+05	8.40E+02	5.72E+04	9.20E+01	6.45E+04	1.04E+02	-99.8	7.9	-112.5	8.4
Rastering (25x25)	Robert-Juillet-2019 21.im	From Surface to Depth- 3D	Image 21	3.41E+05	5.49E+02	3.47E+04	5.58E+01	4.01E+04	6.45E+01	-142.9	10.0	-175.3	10.7
Rastering (25x25)	Robert-Juillet-2019_21.im	From Surface to Depth- 3D	Image 21	3.36E+05	5.40E+02	3.47E+04	5.58E+01	3.91E+04	6.29E+01	-150.7	10.1	-162.6	10.7
Rastering (25x25)	Robert-Juillet-2019 21.im	From Surface to Depth- 3D	Image 21	2.81E+05	4.52E+02	2.78E+04	4.46E+01	3.21E+04	5.15E+01	-167.7	11.2	-198.7	12.0
Rastering (25x25)	Robert-Juillet-2019_21.im	From Surface to Depth- 3D	Image 21	3.11E+05	4.99E+02	3.19E+04	5.13E+01	3.58E+04	5.75E+01	-160.5	10.6	-166.5	11.2
Rastering (25x25)	Robert-Juillet-2019 21.im	From Surface to Depth- 3D	Image 21	2.44E+05	3.92E+02	2.42E+04	3.89E+01	2.74E+04	4.40E+01	-181.1	12.1	-195.9	12.9
Rastering (25x25)	Robert-Juillet-2019_21.im	Depth - 3D	Image 21	2.40E+05	3.86E+02	2.39E+04	3.84E+01	2.69E+04	4.32E+01	-184.2	12.2	-194.4	12.9
Rastering (25x25)	Robert-Juillet-2019_23.im	Surface - 2D	Image 23	1.83E+06	2.67E+02	1.97E+05	2.89E+01	2.08E+05	3.04E+01	-170.4	4.4	-123.8	4.5
Rastering (25x25)	Robert-Juillet-2019_23.im	Surface to core - 2D	Image 23	4.55E+06	2.12E+04	5.74E+05	2.68E+03	6.26E+05	2.93E+03	4.0	2.5	22.0	2.6
Rastering (25x25)	Robert-Juillet-2019_23.im	Surface to core - 2D	Image 23	1.13E+07	1.08E+05	1.41E+06	1.36E+04	1.54E+06	1.48E+04	-6.4	1.6	15.5	1.7
Rastering (25x25)	Robert-Juillet-2019_23.im	Surface to core - 2D	Image 23	8.63E+06	2.21E+05	1.08E+06	2.76E+04	1.17E+06	2.99E+04	-11.7	1.8	13.5	1.9
Rastering (25x25)	Robert-Juillet-2019_23.im	Surface to core - 2D	Image 23	4.66E+06	2.82E+05	5.84E+05	3.54E+04	6.32E+05	3.83E+04	-10.4	2.5	15.0	2.6
Rastering (25x25)	Robert-Juillet-2019_23.im	Surface to core - 2D	Image 23	3.11E+07	4.32E+03	3.87E+06	5.37E+02	4.20E+06	5.82E+02	-16.6	1.0	7.6	1.0
Rastering (25x25)	Robert-Juillet-2019_23.im	Bulk - 2D	Image 23	2.66E+07	1.29E+05	3.33E+06	1.61E+04	3.62E+06	1.75E+04	-8.4	1.1	14.9	1.1
Destering (25-25)	Balant Ivillat 2010, 22 im	Surface 3D	January 22	7.525.05	1.215.02	0.155.04	1.215.02	8.005.04	1.445.00	121.6	7.0	122.5	67
Rastering (25x25)	Robert-Juliet-2019_23.im	Surface - SD	Image 25	7.556+05	1.210+03	8.13E+04	1.316+02	8.98E+04	1.446+02	-151.0	7.0	-122.5	0.7
Rastering (25x25)	Robert-Jullet-2019_23.im	From Surface to Depth - 3D	Image 23	4.58E+05	7.37E+UZ	4.48E+04	7.21E+01 4.255+01	5.00E+04	8.05E+01	-203.6	9.4	-207.0	8.9
Rastering (25x25)	Robert-Juliet-2019_23.im	From Surface to Depth - 3D	Image 25	2.796+05	4.496+02	2.702+04	4.552+01	5.052+04	4.912+01	-202.6	12.2	-214.0	11.5
Rastering (25x25)	Robert-Jullet-2019_23.lm	From Surface to Depth - 3D	Image 23	1.36E+U5	2.18E+U2	1.14E+04	1.83E+01	1.26E+04	2.03E+01	-321.7	18.8	-320.2	17.8
Rastering (25x25)	Robert-Jullet-2019_23.lm	From Surface to Depth - 3D	Image 23	8.98E+04	1.45E+U2	1.36E+04	2.19E+01	8.8/E+U3	1.43E+01	-280.2	17.1	227.5	21.2
Rastering (25x25)	Robert-Jullet-2019_23.Im	From Surface to Depth - 3D	image 23	4.72E+04	7.60E+01	7.80E+03	1.265+01	3.66E+U3	5.89E+00	-435.5	22.6	339.0	33.1
Rastering (25x25)	KODERT-JUIIIET-2019_23.IM	From Surrace to Depth - 3D	image 23	3.15E+04	5.U/E+01	5.45E+03	8.77E+00	6.04E+03	9.73E+00	398.9	27.1	401.3	25.7
Kastering (25x25)	KODERT-JUIIIET-2019_23.IM	From Surrace to Depth - 3D	image 23	1.12E+04	1.81E+01	2.62E+03	4.22E+00	2.93E+03	4./1E+00	903.9	39.1	893.5	37.0
Rastering (25x25)	Robert-Juillet-2019_23.im	From Surface to Depth - 3D	Image 23	5.06E+03	8.14E+00	1.14E+03	1.84E+00	1.2/E+03	2.04E+00	823.6	59.2	828.2	56.2
Kastering (25x25)	Kobert-Juillet-2019_23.im	At Depth - 3D	Image 23	4.82E+03	7.76E+00	ь.49E+02	1.04E+00	6.94E+02	1.12E+00	50.5	/8.5	91.9	/5.9
Rastering (25x25)	Robert-Juillet-2019_23.im	Beneath the grain - 3D	Image 23	5.46E+04	4.49E+00	7.00E+03	5./6E-01	7.26E+03	5.98E-01	-29.3	23.5	40.0	23.9

<u>Table S3.2</u>: Magnesium isotopic composition expressed as  $\delta^{25}Mg(\%)$  and  $\delta^{26}Mg(\%)$ . The plasma discharge is generated in a mixture MgCl<sub>2</sub> - Pentanol - N<sub>2</sub>. The ionic counting rates are expressed in counts per second (cps) while the total number of counts (Tot) depend on the duration of the measurement. Error bars are the statistical precision calculated on the total number of counts (±2 $\sigma$ ). The average value of the PDCM is used as the reference value (cf. previous Table S3.1) for calculating the  $\delta$  values of the hotspots exhibiting marked departure in their isotopic composition. The average PDCM ionic ratios <sup>25</sup>Mg/<sup>24</sup>Mg and <sup>26</sup>Mg/<sup>24</sup>Mg are indicated as *Reference Std value*. Samples noted 2D and 3D indicates that the Mg isotopic compositions were measured (i) by image analysis as a cross section from the surface to the core of the hotspots (ii) by depth profiling until the complete disappearance of the hotspot caused by its sputtering. This Table was used to construct the Figure 1 of the text.

Faraday on 16O, EM on 17O and 18O Pentanol / N2O				170/160 Reference value for delta 3.709E-04 180/160 Reference value for delta 1.972E-03								
San Carlos Olivine.	Sample	Comments	16O Tot.	16O Cps	17O Tot.	17O Cps	180 Tot.	18O Cps	Delta 18 ‰	± 18 (2s) %	Delta 17 ‰	±17 (2s) ‰
Randoom Aroo I	Robert Oct 2010, Lim	<b>Balished</b> section	0.52E+07	1 16E+05	2 70E+04	4.52E+01	1.07E±05	2.415+02	40.0	4.5	10 0	10.4
Randoom Area 3	Robert-Oct-2019_1.im	Polished section	9.32E+07 8.41E+07	1.03E+05	3.30E+04	4.03E+01 4.03E+01	1.74E+05	2.41E+02 2.13E+02	51.1	4.8	57.9	11.0
Randoom Area 1	Robert-Oct-2019_2.im	Polished section	1.39E+08	1.05E+05	5.40E+04	4.05E+01	2.87E+05	2.16E+02	48.6	3.7	46.7	8.6
Randoom Area 2 Randoom Area 3	Robert-Oct-2019_2.im Robert-Oct-2019_2.im	Polished section Polished section	1.15E+08 1.39E+08	8.66E+04 1.04E+05	4.52E+04 5.43E+04	3.39E+01 4.08E+01	2.37E+05 2.87E+05	1.78E+02 2.16E+02	47.3	4.1	58.5 53.2	9.4 8.6
Randoom Area 4	Robert-Oct-2019_2.im	Polished section	1.32E+08	9.91E+04	5.18E+04	3.89E+01	2.74E+05	2.06E+02	52.9	3.8	57.5	8.8
D. Rumble's Kerogen	Sample	Comments	16O Tot.	16O Cps	170 Tot.	17O Cps	180 Tot.	18O Cps	Delta 18 ‰	± 18 (2s) ‰	Delta 17 ‰	±17 (2s) ‰
Randoom Area 1	Robert-Oct-2019_5.im	Organic Matter in Powder	2.20E+08	6.25E+04	8.62E+04	2.44E+01	4.55E+05	1.29E+02	48.0	6.8	56.4	3.0
Randoom Area 3	Robert-Oct-2019_5.im	Organic Matter in Powder	2.40E+07	6.80E+03	9.32E+03	2.64E+01	4.88E+04	1.38E+01	32.2	20.7	46.8	9.0
Randoom Area 4	Robert-Oct-2019_5.im	Organic Matter in Powder	3.10E+08	8.80E+04	1.21E+05	3.43E+01	6.33E+05	1.79E+02	35.0	5.7	53.8	2.5
Randoom Area 5 Randoom Area 6	Robert-Oct-2019_5.im Robert-Oct-2019_5 im	Organic Matter in Powder Organic Matter in Powder	1.47E+08 1.27E+08	4.16E+04 3.61E+04	5.76E+04 4.95E+04	1.63E+01 1.40E+01	3.03E+05 2.62E+05	8.58E+01 7.44E+01	43.9	8.3	56.3 50.3	3.6
Randoom Area 7	Robert-Oct-2019_5.im	Organic Matter in Powder	2.30E+08	6.53E+04	9.02E+04	2.56E+01	4.75E+05	1.35E+02	47.3	6.7	57.5	2.9
Randoom Area 8 Randoom Area 9	Robert-Oct-2019_5.im Robert-Oct-2019_5.im	Organic Matter in Powder Organic Matter in Powder	3.30E+07 1.80E+07	9.34E+03 5.11E+03	1.29E+04 7.04E+03	3.65E+00 1.99E+00	6.77E+04 3.69E+04	1.92E+01 1.05E+01	40.4 40.9	17.6 23.8	51.3 53.9	7.7 10.4
FDO	Samula	Comments	160 Tot	160 Cres	170 Tot	170 Cres	180 Tot	180 Cres	Delta 18	± 18 (2s)	Delta 17	±17 (2s)
PDCM (Used as Referen	ce)	Comments	101.	Cps	100.	Cps	100.	cps	/00		/00	/00
Rastering (15x15) Rastering (15x15)	FR9@1_1 FR9@1_2	Collected as a Powder Collected as a Powder	7.65E+08 8.01E+08	2.34E+06 2.44E+06	2.86E+05 2.95E+05	8.72E+02 8.99E+02	1.52E+06 1.58E+06	4.65E+03 4.82E+03	9.8	1.6	6.4 -7.9	3.7
Rastering (15x15)	FR9@1_3	Collected as a Powder	7.78E+08	2.37E+06	2.89E+05	8.82E+02	1.53E+06	4.67E+03	-2.7	1.6	2.2	3.7
Rastering (15x15)	FR9@1_4	Collected as a Powder	8.18E+08	2.50E+06	3.06E+05	9.32E+02	1.60E+06	4.89E+03	-5.9	1.6	6.6	3.6
Rastering (15x15) Rastering (15x15)	FR9@1_5 FR9@1_6	Collected as a Powder Collected as a Powder	7.4/E+08 7.87E+08	2.28E+06 2.40E+06	2.80E+05 2.92E+05	8.54E+02 8.92E+02	1.51E+06 1.57E+06	4.59E+03 4.80E+03	12.9	1.6	0.4	3.8
Rastering (15x15)	FR9@1_7	Collected as a Powder	7.66E+08	2.34E+06	2.83E+05	8.63E+02	1.54E+06	4.70E+03	20.5	1.6	-4.7	3.8
Rastering (15x15)	FR9@1_8	Collected as a Powder	8.77E+08	2.68E+06	3.20E+05	9.76E+02	1.71E+06	5.23E+03	-8.9	1.5	-16.3	3.5
Rastering (15x15) Rastering (15x15)	FR9@1_9 FR9@1_10	Collected as a Powder Collected as a Powder	7.95E+08 8.16E+08	2.43E+06 2.49E+06	2.99E+05 3.04E+05	9.12E+02 9.26E+02	1.56E+06 1.63E+06	4.75E+03 4.97E+03	-7.1	1.6	14.1	3.7
Rastering (15x15)	FR9@1_11	Collected as a Powder	8.13E+08	2.48E+06	3.05E+05	9.30E+02	1.64E+06	5.00E+03	21.9	1.6	10.7	3.6
Rastering (15x15)	FR9@1_12	Collected as a Powder	8.33E+08	2.54E+06	3.05E+05	9.32E+02	1.65E+06	5.03E+03	2.8	1.6	-12.3	3.6
Rastering (15x15) Rastering (15x15)	FR9@1_13 FR9@1_14	Collected as a Powder Collected as a Powder	8.73E+08 7.92E+08	2.66E+06 2.42E+06	3.21E+05 2.92E+05	9.79E+02 8.91E+02	1.72E+06 1.55E+06	5.24E+03 4 73E+03	-2.5	1.5	-9.3	3.5
Rastering (15x15)	FR9@1_15	Collected as a Powder	8.24E+08	2.52E+06	3.08E+05	9.39E+02	1.62E+06	4.94E+03	-4.7	1.6	6.9	3.6
Rastering (15x15)	FR9@1_16	Collected as a Powder	8.19E+08	2.50E+06	3.04E+05	9.27E+02	1.60E+06	4.89E+03	-8.5	1.6	0.0	3.6
Rastering (15x15) Rastering (15x15)	FR9@1_17 FR9@1_18	Collected as a Powder Collected as a Powder	8.33E+08 8.27E+08	2.54E+06 2.52E+06	3.12E+05 3.10E+05	9.51E+02 9.45E+02	1.63E+06 1.62E+06	4.99E+03 4 94E+03	-5.1	1.6	8.4 9.6	3.6
Rastering (15x15)	FR9@1_19	Collected as a Powder	7.32E+08	2.23E+06	2.75E+05	8.38E+02	1.43E+06	4.35E+03	-11.7	1.7	12.1	3.8
Rastering (15x15)	FR9@1_20	Collected as a Powder	8.87E+08	2.71E+06	3.28E+05	1.00E+03	1.78E+06	5.42E+03	16.6	1.5	-2.7	3.5
Rastering (15x15) Rastering (15x15)	FR9@1_21 FR9@1_22	Collected as a Powder Collected as a Powder	7.9/E+08 7.78E+08	2.43E+06 2.37E+06	2.96E+05 2.87E+05	9.04E+02 8.75E+02	1.59E+06 1.52E+06	4.8/E+03 4.64E+03	-8.6	1.6	-6.1	3.7
Rastering (15x15)	FR9@1_23	Collected as a Powder	7.87E+08	2.40E+06	2.87E+05	8.77E+02	1.55E+06	4.72E+03	-3.7	1.6	-15.9	3.7
Rastering (15x15)	FR9@1_24	Collected as a Powder	7.94E+08	2.42E+06	2.92E+05	8.90E+02	1.56E+06	4.75E+03	-5.0	1.6	-9.6	3.7
Rastering (15x15) Rastering (15x15)	FR9@1_25 FR9@1_26	Collected as a Powder	8.33E+08	2.57E+06 2.54E+06	2.93E+05 3.12E+05	9.51E+02	1.55E+06 1.66E+06	4.67E+03 5.07E+03	-0.6	1.6	8.8	3.7
Rastering (15x15)	FR9@1_27	Collected as a Powder	8.27E+08	2.52E+06	3.08E+05	9.39E+02	1.64E+06	5.01E+03	7.5	1.6	3.0	3.6
Rastering (15x15)	FR9@1_28	Collected as a Powder	7.71E+08	2.35E+06	2.81E+05	8.58E+02	1.52E+06	4.64E+03	-0.9	1.6	-17.2	3.8
Rastering (15x15)	FR9@1_29 FR9@1_30	Collected as a Powder Collected as a Powder	8.27E+08 8.18E+08	2.53E+06 2.50E+06	3.03E+05	9.46E+02 9.25E+02	1.65E+06 1.64E+06	5.03E+03 5.01E+03	10.9	1.6	-0.4	3.6
Rastering (15x15)	FR9@1_31	Collected as a Powder	8.16E+08	2.49E+06	2.99E+05	9.13E+02	1.63E+06	4.98E+03	15.5	1.6	-11.0	3.7
Rastering (15x15)	FR9@1_32	Collected as a Powder	8.16E+08	2.49E+06	3.04E+05	9.27E+02	1.63E+06	4.97E+03	11.8	1.6	3.2	3.6
Rastering (15x15)	FR9@1_33 FR9@1_34	Collected as a Powder	7.81E+08 8.40E+08	2.58E+06 2.56E+06	2.93E+05 3.10E+05	9.46E+02	1.54E+06 1.65E+06	4.70E+03 5.02E+03	-0.5	1.6	-4.9	3.7
Rastering (15x15)	FR9@1_35	Collected as a Powder	8.61E+08	2.63E+06	3.12E+05	9.52E+02	1.68E+06	5.14E+03	-8.5	1.5	-23.2	3.6
Rastering (15x15)	FR9@1_36	Collected as a Powder	7.86E+08	2.40E+06	2.93E+05	8.94E+02	1.54E+06	4.71E+03	-4.5	1.6	5.1	3.7
Rastering (15x15)	FR9@1_37	Collected as a Powder	7.96E+08	2.43E+00 2.43E+06	2.98E+05	9.11E+02 9.11E+02	1.56E+06	4.81E+03 4.77E+03	-4.6	1.6	10.5	3.0
Rastering (15x15)	FR9@1_39	Collected as a Powder	7.99E+08	2.44E+06	2.95E+05	9.01E+02	1.56E+06	4.77E+03	-6.6	1.6	-3.8	3.7
Rastering (15x15) Restoring (15x15)	FR9@1_40	Collected as a Powder	8.00E+08	2.44E+06	2.90E+05	8.84E+02	1.56E+06	4.75E+03	-13.0	1.6	-24.3	3.7
Rastering (15x15)	FR9@1_41	Collected as a Powder	7.79E+08	2.30E+00 2.38E+06	2.90E+05	8.87E+02	1.52E+06	4.43E+03 4.63E+03	-10.2	1.6	5.4	3.8
Rastering (15x15)	FR9@1_43	Collected as a Powder	7.58E+08	2.31E+06	2.81E+05	8.59E+02	1.48E+06	4.50E+03	-12.8	1.6	0.8	3.8
Rastering (15x15) Rastering (15x15)	FR9@1_44 FR9@1_45	Collected as a Powder Collected as a Powder	7.92E+08 7.85E+08	2.42E+06 2.40E+06	2.95E+05 2.92E+05	9.00E+02 8.90E+02	1.54E+06 1.53E+06	4.69E+03 4.66E+03	-16.0	1.6	3.6	3.7
Rastering (15x15) Rastering (15x15)	FR9@1_46	Collected as a Powder	7.62E+08	2.32E+06	2.85E+05	8.70E+02	1.49E+06	4.54E+03	-10.2	1.6	8.5	3.7
Rastering (15x15)	FR9@1_47	Collected as a Powder	7.44E+08	2.27E+06	2.75E+05	8.39E+02	1.45E+06	4.42E+03	-13.4	1.7	-4.5	3.8
Rastering (15x15) Restoring (15x15)	FR9@1_48	Collected as a Powder	8.03E+08	2.45E+06	2.98E+05	9.09E+02 8.47E+02	1.56E+06	4.77E+03	-12.3	1.6	0.2	3.7
Rastering (15x15) Rastering (15x15)	FR9@1_49	Collected as a Powder	7.65E+08	2.30E+00 2.33E+06	2.78E+05 2.84E+05	8.67E+02	1.48E+06	4.43E+03 4.51E+03	-19.8	1.6	1.3	3.8
Rastering (15x15)	FR9@1_51	Collected as a Powder	7.39E+08	2.26E+06	2.74E+05	8.37E+02	1.45E+06	4.43E+03	-3.8	1.7	-0.2	3.8
Rastering (15x15) Restoring (15x15)	FR9@1_52	Collected as a Powder	6.88E+08	2.10E+06	2.59E+05	7.90E+02	1.37E+06	4.17E+03	6.5	1.7	13.3	3.9
Rastering (15x15)	FR9@1_55	Collected as a Powder	7.17E+08	2.20E+00 2.19E+06	2.64E+05 2.69E+05	8.20E+02	1.42E+00 1.42E+06	4.33E+03 4.32E+03	1.9	1.7	10.6	3.9
Rastering (15x15)	FR9@1_55	Collected as a Powder	7.08E+08	2.16E+06	2.61E+05	7.96E+02	1.40E+06	4.26E+03	0.1	1.7	-7.3	3.9
Rastering (15x15) Restering (15x15)	FR9@1_56 FR9@1_57	Collected as a Powder	6.97E+08 7.36E+08	2.13E+06 2.25E+06	2.58E+05 2.74E+05	7.89E+02 8.36E+02	1.37E+06	4.18E+03 4.39E+03	-4.1	1.7	-0.7	3.9
Rastering (15x15)	FR9@1_59	Collected as a Powder	7.49E+08	2.29E+06	2.79E+05	8.52E+02	1.47E+06	4.49E+03	-4.5	1.6	5.4	3.8
Rastering (15x15)	FR9@1_60	Collected as a Powder	7.10E+08	2.17E+06	2.60E+05	7.95E+02	1.41E+06	4.29E+03	5.0	1.7	-11.4	3.9
Rastering (15x15) Rastering (15x15)	FR9@1_61 FR9@1_62	Collected as a Powder Collected as a Powder	6.46E+08 6.51E+08	1.97E+06 1.99E+06	2.37E+05 2.45E+05	7.24E+02 7.48E+02	1.28E+06 1.28E+06	3.89E+03 3.91F+03	1.3	1.8	-10.8	4.1
Rastering (15x15)	FR9@1_63	Collected as a Powder	6.91E+08	2.11E+06	2.58E+05	7.87E+02	1.35E+06	4.13E+03	-5.9	1.0	6.2	3.9
Rastering (15x15)	FR9@1_64	Collected as a Powder	6.31E+08	1.93E+06	2.35E+05	7.18E+02	1.24E+06	3.78E+03	-3.1	1.8	5.5	4.1
Rastering (15x15) Rastering (15x15)	FR9@1_65 FR9@1_66	Collected as a Powder Collected as a Powder	6.73E+08 7.44E+09	2.05E+06 2.27E+04	2.48E+05 2.75E+05	7.58E+02 8.41E+02	1.34E+06	4.09E+03 4.53E+02	11.4	1.7	-4.7	4.0
Rastering (15x15)	FR9@1_67	Collected as a Powder	7.40E+08	2.26E+06	2.77E+05	8.45E+02	1.47E+06	4.50E+03	10.0	1.6	8.2	3.8
Rastering (15x15)	FR9@1_68	Collected as a Powder	7.11E+08	2.17E+06	2.62E+05	8.01E+02	1.41E+06	4.30E+03	5.2	1.7	-5.2	3.9
Rastering (15x15)	FR9@1_69	Collected as a Powder	7.05E+08	2.15E+06	2.56E+05	7.82E+02	1.41E+06	4.29E+03	11.7	1.7	-19.8	4.0
Rastering (15x15)	FR9@1_70	Collected as a Powder	6.96E+08	2.22E+06 2.13E+06	2.60E+05	6.24E+02 7.92E+02	1.43E+06 1.37E+06	4.30E+03 4.19E+03	-3.2	1.7	4.9	3.8 3.9
Rastering (15x15)	FR9@1_72	Collected as a Powder	6.90E+08	2.11E+06	2.57E+05	7.84E+02	1.37E+06	4.19E+03	8.2	1.7	3.4	3.9
Rastering (15x15) Rastering (15x15)	FR9@1_73 FR9@1_74	Collected as a Powder Collected as a Powder	7.21E+08 7.39E+08	2.20E+06 2.26E+06	2.68E+05 2.73E+05	8.19E+02 8.34E+02	1.45E+06 1.48E+06	4.44E+03 4.53E+03	23.4	1.7	4.0	3.9
	····@·_/¬	concerce as a rowuch	1		a., J.L. 00	0.010102			.0.0	1.0	2.0	5.0

<u>Table S3.3</u>: Oxygen isotopic composition expressed as  $\delta^{17}O(\infty)$  and  $\delta^{18}O(\infty)$ . The plasma discharge is generated in a mixture N<sub>2</sub>O - Pentanol. The sample collected on the glass walls is noted *Powder*. The ionic counting rates are expressed in counts per second (cps) while the total number of counts (Tot) depend on the duration of the measurement. The average value of the PDCM is used as the reference value for calculating the  $\delta$  values of the hotspots exhibiting marked departure in their isotopic composition. The ionic ratios  ${}^{17}O/{}^{16}O$  and  ${}^{18}O/{}^{16}O$  used to calculate the  $\delta$  values are indicated as *Reference Std value*. They correspond to the average values determined on the PDCM noted FR9 in this Table. Error bars are the statistical precision calculated on the total number of counts ( $\pm 2\sigma$ ). Three examples of the statistical distribution of the data is shown for (1) an olivine sample (San Carlos) (2) a terrestrial kerogen (noted D. Rumble) for which the  $\delta^{17}O$  and  $\delta^{18}O(\infty)$  were determined relative to SMOW ( $\approx$ +0.5 and  $\approx$ +1.0  $\infty$ , respectively) (3) one region of the sample (noted PDCM) showing a statistical distribution of isotope ratios. The PDCM distribution is reported in Figure S3.3 bellow.



<u>Figure S3.3</u>: An example of the distribution of data recorded randomly on the PDCM is shown as  $\delta^{17}O$  (‰) *vs.*  $\delta^{18}O$  (‰). *Samples FR9@1* in Table S3.3. The reproducibility on the average is ±21.7 and ±18.4 (2 $\sigma$ ) on  $\delta^{17}O$  (‰) and  $\delta^{18}O$  (‰), respectively. Error bars stand for the statistical analytical error. The statistical error bars depend only on the total number of ions detected. These error bars do not overlap 0-0‰ because the stochastic distribution of the data caused by topographic effects exceeds by far this statistical error.

Faraday on 16O, EM on 17O and 18O
Pentanol / N2O

17O/16O PDCM used as the reference = 3.709E-04 18O/16O PDCM used as the reference = 1.972E-03

	Sample	Comments	16O Tot.	16O Cps	170 Tot.	17O Cps	18O Tot.	18O Cps	Delta 18 ‰	± 18 (2s) ‰	Delta 17 ‰	±17 (2s) ‰
Depth Profiling	FR12@2 66	Area 1 in PDCM Powder	4.53E+08	1.38E+06	1.58E+05	4.81E+02	8.09E+05	2.47E+03	-94.0	2.2	-61.8	5.0
Depth Profiling	FR12@2_67	Area 1 in PDCM Powder	1.03E+09	3.13E+06	2.73E+05	8.34E+02	1.42E+06	4.35E+03	-294.9	1.7	-280.9	3.8
Depth Profiling	FR12@2_68	Area 1 in PDCM Powder	8.95E+08	2.73E+06	2.34E+05	7.13E+02	1.24E+06	3.77E+03	-299.8	1.8	-296.0	4.1
Depth Profiling	FR12@2_69	Area 1 in PDCM Powder	7.91E+08	2.41E+06	1.88E+05	5.75E+02	9.96E+05	3.04E+03	-361.6	2.0	-358.1	4.6
Depth Profiling	FR12@2_70	Area 1 in PDCM Powder	7.31E+08	2.23E+06	1.71E+05	5.22E+02	9.10E+05	2.78E+03	-368.2	2.1	-368.6	4.8
Depth Profiling	FR12@4_1	Area 2 in PDCM Powder	7.34E+08	2.24E+06	2.34E+05	7.13E+02	1.19E+06	3.64E+03	-176.2	1.8	-142.1	4.1
Depth Profiling	FR12@4_2	Area 2 in PDCM Powder	1.26E+09	3.85E+06	4.05E+05	1.24E+03	2.08E+06	6.34E+03	-165.1	1.4	-135.5	3.1
Depth Profiling	FR12@4_3	Area 2 in PDCM Powder	1.60E+09	4.90E+06	5.45E+05	1.66E+03	2.86E+06	8.71E+03	-97.2	1.2	-84.5	2.7
Depth Profiling	FR12@8_1	Area 4 in PDCM Powder	1.19E+09	3.64E+06	3.30E+05	1.01E+03	1.70E+06	5.19E+03	-276.4	1.5	-254.8	3.5
Depth Profiling	FR12@8_2	Area 4 in PDCM Powder	1.61E+09	4.91E+06	4.72E+05	1.44E+03	2.44E+06	7.44E+03	-232.2	1.3	-210.3	2.9
Depth Profiling	FR12@8_3	Area 4 in PDCM Powder	1.18E+09	3.62E+06	3.73E+05	1.14E+03	1.93E+06	5.88E+03	-174.7	1.4	-150.6	3.3
Depth Profiling	FR12@8_4	Area 4 in PDCM Powder	1.15E+09	3.52E+06	3.43E+05	1.05E+03	1.80E+06	5.50E+03	-208.0	1.5	-197.2	3.4
Depth Profiling	FR12@8_5	Area 4 in PDCM Powder	1.36E+09	4.15E+06	4.26E+05	1.30E+03	2.24E+06	6.85E+03	-162.3	1.3	-154.9	3.1

<u>Table S3.4</u>: Oxygen isotopic composition expressed as  $\delta^{17}O(\%)$  and  $\delta^{18}O(\%)$ . The plasma discharge is generated in a mixture N<sub>2</sub>O - Pentanol. The sample collected on the glass walls is noted *Powder*. The ionic counting rates are expressed in counts per second (cps) while the total number of counts (Tot) depend on the duration of the measurement. The ionic ratios  ${}^{17}O/{}^{16}O$  and  ${}^{18}O/{}^{16}O$  used to calculate the  $\delta$  values are indicated as *PDCM used as the reference*. They correspond to the average values determined on the PDCM noted FR9 (cf. previous Table S3.3). Error bars are the statistical precision calculated on the total number of counts ( $\pm 2\sigma$ ). No hotspot (i.e. no increase in the ionic intensities) is observed at the location (noted *Area*) where MIF effect was measured. This Table was used to construct the Figure 2 of the text.

#### <u>S3.4</u>:



#### 17O/16O PDCM used as the reference = 3.717E-04 18O/16O PDCM used as the reference = 2.130E-03

180/10011	ocwi useu as the reference -	2.130E-03	160	160	170	170	180	180	Delta 18	± 18 (2s)	Delta 17	±17 (2s)
FR35	Sample	Comments	Tot.	Cps	Tot.	Cps	Tot.	Cps	‰	‰	‰	‰
Hat Smat 2	Dahart Inillat 2020 Aim	Hat Saat on Si Wafan	1.755 1.06	6.400-04	0.075+02	2.25E+01	5 10E+02	1.965 0.02	267.2	14.0	264.1	22.6
Hot Spot 2	Robert-Juillet-2020_4.im	Hot Spot on Si Wafer	6.34E+05	0.40E+04 1 30E+05	8.87E+02 2.47E+02	5.06E+01	1.37E+03	2.81E+02	14 7	27.0	48.4	55.0 63.6
Hot Spot 5	Robert-Juillet-2020 4.im	Hot Spot on Si Wafer	1.81E+06	5.85E+04	7.09E+02	2.29E+01	3.99E+03	1.29E+02	32.7	15.8	52.6	37.6
Hot Spot 7	Robert-Juillet-2020_5.im	Hot Spot on Si Wafer	1.60E+06	3.79E+04	6.51E+02	1.54E+01	3.49E+03	8.28E+01	25.7	16.9	95.2	39.2
Hot Spot 8	Robert-Juillet-2020_5.im	Hot Spot on Si Wafer	2.10E+06	6.49E+04	7.95E+02	2.46E+01	4.39E+03	1.36E+02	-18.8	15.1	18.5	35.5
Hot Spot 9	Robert-Juillet-2020_5.im Robert-Juillet-2020_5.im	Hot Spot on Si Wafer	3.43E+06	8.49E+04	1.34E+03	3.33E+01	6.98E+03	1.73E+02 2.57E+01	-44.2	12.0	55.4	27.3
Hot Spot 6 Hot Spot Outside	Robert-Juillet-2020_5.im	Hot Spot on Si Wafer	1.59E+06 8.49E+06	8.94E+02	3.92E+03	4.86E+00 4.13E-01	2.17E+04	2.37E+01 2.29E+00	202.6	6.8	243.2	16.0
4 Hot Spots	Robert-Juillet-2020 9.im	Hot Spot on Si Wafer	1.39E+06		6.43E+02		3.46E+03		163.9	17.0	240.9	39.4
Hot Spot	Robert-Juillet-2020_9.im	Hot Spot on Si Wafer	3.34E+06	3.91E+02	1.61E+03	1.88E-01	9.12E+03	1.07E+00	280.3	10.5	294.2	24.9
Bulk Image	Robert-Juillet-2020_9.im	On Si Wafer	1.88E+07	2.07E+03	8.01E+03	8.82E-01	4.49E+04	4.94E+00	122.8	4.7	148.8	11.2
			160	160	170	170	180	180	Delta 18	+18(2s)	Delta 17	+17(2s)
FR35	Sample	Comments	Tot.	Cps	Tot.	Cps	Tot.	Cps	%		%	
Random Area 1	Robert-Juillet-2020_10.im	On Si Wafer	1.38E+06	4.45E+03	9.23E+02	2.98E+00	7.02E+03	2.26E+01	1390.5	11.9	801.4	32.9
Random Area 2	Robert-Juillet-2020_10.im Robert-Juillet-2020_10.im	On Si Wafer	5.00E+05 5.70E+05	1.61E+03	3.26E+02	1.05E+00 1.17E+00	2.21E+03	7.14E+00 0.10E+00	10/8.0	21.3	754.2	55.4 52.4
Random Area 4	Robert-Juillet-2020_10.im	On Si Wafer	2.55E+06	8.23E+03	1.55E+03	5.00E+00	1.11E+04	3.59E+01	1048.0	9.5	632.7	25.4
Random Area 5	Robert-Juillet-2020_10.im	On Si Wafer	1.71E+06	5.50E+03	1.01E+03	3.27E+00	7.32E+03	2.36E+01	1013.1	11.7	598.7	31.4
Random Area 6	Robert-Juillet-2020_10.im	On Si Wafer	1.25E+06	4.03E+03	7.93E+02	2.56E+00	5.79E+03	1.87E+01	1177.4	13.1	708.4	35.5
Random Area 7	Robert-Juillet-2020_10.im Robert-Juillet-2020_10.im	On Si Wafer	2.42E+06	7.80E+03	1.50E+03	4.85E+00	9.58E+03	3.09E+01	860.2	10.2	671.8	25.8
Random Area 9	Robert-Juillet-2020_10 im	On Si Wafer	9.73E+05	3.14E+03	5.47E+02	1.76E+00	3.72E+03	1.40E+01	724.0	16.4	512.6	42.8
Random Area 4	Robert-Juillet-2020_17.im	On Si Wafer	5.49E+06	1.58E+04	2.29E+03	6.59E+00	1.23E+04	3.56E+01	55.7	9.0	119.4	20.9
ED 25	Sampla	Commonte	160 Tet	160 Crss	170 Tot	170 Crs	180 Tet	180 Cms	Delta 18	± 18 (2s)	Delta 17	±17 (2s)
FR35	Sample	Comments	101.	Chs	100.	cps	101.	Chs	/00	/00	/00	/00
Hot Spot 1	Robert-Juillet-2020_17.im	Hot Spot on Si Wafer	1.93E+06	2.62E+05	9.80E+02	1.33E+02	4.73E+03	6.41E+02	149.0	14.5	364.2	31.9
Hot Spot 2	Robert-Juillet-2020_17.im	Hot Spot on Si Wafer	2.62E+05	4.50E+04	2.09E+02	3.59E+01	1.25E+03	2.15E+02	1240.9	28.3	1145.3	69.2
Hot Spot 3	Robert-Juillet-2020_17.im	Hot Spot on Si Wafer	1.14E+07	4.11E+05	5.27E+03	1.89E+02	2.60E+04	9.34E+02	65.8	6.2	237.5	13.8
Hot Spot 5 Hot Spot 7	Robert-Juillet-2020_17.im Robert-Juillet-2020_17.im	Hot Spot on Si Wafer Hot Spot on Si Wafer	4.4/E+06 7.20E+06	3.45E+05 3.57E+05	1.98E+03 3.12E+03	1.53E+02 1.55E+02	1.03E+04 1.63E+04	7.93E+02 8.07E+02	/9.4 61.4	9.9	193.0	22.5
Hot Spot 8	Robert-Juillet-2020_17.im	Hot Spot on Si Wafer	8.46E+06	3.45E+05	3.59E+03	1.46E+02	1.83E+04	7.48E+02	18.3	7.4	142.4	16.7
Hot Spot 9	Robert-Juillet-2020_17.im	Hot Spot on Si Wafer	6.01E+05	4.66E+04	3.60E+02	2.79E+01	2.14E+03	1.66E+02	669.3	21.6	613.0	52.7
Hot Spot 10	Robert-Juillet-2020_17.im	Hot Spot on Si Wafer	1.28E+06	1.08E+05	6.18E+02	5.20E+01	3.36E+03	2.83E+02	231.3	17.2	296.7	40.2
Hot Spot 11	Robert-Juillet-2020_17.im	Hot Spot on Si Wafer	1.57E+06	1.82E+05	7.54E+02	8.73E+01	3.79E+03	4.38E+02	132.3	16.2	291.6	36.4
Hot Spot 12 Hot Spot 13	Robert-Juillet-2020_17.im	Hot Spot on Si Wafer	2 29E+05	2.38E+03 9.54E+04	3.17E+02	6.71E+01	2.77E+03 8.88E+02	0.55E+02 3.70E+02	820.4	33.6	231.3	44.0 78.8
Random Area 5	Robert-Juillet-2020_17.im	On Si Wafer	5.36E+06	1.55E+04	2.31E+03	6.67E+00	1.22E+04	3.52E+01	69.3	9.0	160.3	20.8
Random Area 6	Robert-Juillet-2020_17.im	On Si Wafer	2.34E+07	6.74E+04	1.01E+04	2.91E+01	5.32E+04	1.54E+02	69.9	4.3	159.5	10.0
Random Area 7	Robert-Juillet-2020_17.im	On Si Wafer	6.42E+06	1.85E+04	3.04E+03	8.78E+00	1.64E+04	4.74E+01	200.0	7.8	274.0	18.1
Random Area 8	Robert-Juillet-2020_17.im Robert-Juillet-2020_17.im	On Si Wafer	3.32E+06	9.57E+03 8.20E+04	1.50E+03	4.31E+00 2.64E+01	8.38E+03	2.42E+01	186.2	10.9	212.8	25.9
Hot Spot 6	Robert-Juillet-2020_17.im	Hot Spot on Si Wafer	2.84E+07 8.52E+06	2.55E+05	3.50E+03	1.05E+02	1.83E+04	5.48E+02	9.5	7.4	196.4	16.9
Random Area 2	Robert-Juillet-2020_17.im	On Si Wafer	1.05E+07	3.03E+04	4.28E+03	1.23E+01	2.26E+04	6.52E+01	9.6	6.7	94.3	15.3
Hot Spot 4	Robert-Juillet-2020_17.im	Hot Spot on Si Wafer	7.32E+06	3.09E+05	3.09E+03	1.31E+02	1.59E+04	6.72E+02	19.3	7.9	135.8	18.0
Pandam Araa 2	Robert Juillet 2020, 17 im	On Si Wafar	2 605 107	1.075.07	1.520.04	$4.20E \pm 0.1$	$7.00E \pm 0.4$	2 28E±02	6.1	26	1106	0 1
Kaliuolii Alea 3	Robert-Jumet-2020_17.im	On SI water	3.09E±07	1.06E+05	1.32E±04	4.391.101	7.901.104	2.281.102	0.1	5.0	110.0	0.1
Kandom Area 5	Kobert-Juliet-2020_17.iii	On SI water	3.09E±07	1.06E+05	1.52E±04	4.592+01	7.901-04	2.281102	0.1	5.0	110.6	0.1
Kalidoni Alea 3	Kobert-Juniet-2020_17.in	On SI water	160	1.06E+05	1.52E+04	170	180	180	Delta 18	± 18 (2s)	Delta 17	±17 (2s)
FR35	Sample	Comments	160 Tot.	160 Cps	1.32E+04 17O Tot.	4.39E+01 170 Cps	180 Tot.	180 Cps	0.1 Delta 18 ‰	± 18 (2s)	Delta 17 ‰	±17 (2s)
FR35	Sample	Comments Hot Spot on Si Wafer	160 Tot. 8 71F+06	160 Cps	170 Tot.	170 Cps 6 59E+01	180 Tot.	180 Cps	0.1 Delta 18 %	± 18 (2s) %	Delta 17 %	±17 (2s)
FR35 Hot Spot 3 Hot Spot 8	Sample Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer	160 Tot. 8.71E+06 5.75E+06	1.06E+05 160 Cps 1.54E+05 1.25E+05	170 Tot. 3.74E+03 2.59E+03	170 Cps 6.59E+01 5.64E+01	180 Tot. 1.91E+04 1.33E+04	180 Cps 3.36E+02 2.89E+02	0.1 Delta 18 %	± 18 (2s) ‰ 7.2 8.7	Delta 17 %	±17 (2s) ‰
FR35 Hot Spot 3 Hot Spot 8 Hot Spot 10	Sample Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer Hot Spot on Si Wafer	160 Tot. 8.71E+06 5.75E+06 1.42E+06	1.06E+05 160 Cps 1.54E+05 1.25E+05 1.68E+05	170 Tot. 3.74E+03 2.59E+03 6.33E+02	170 Cps 6.59E+01 5.64E+01 7.47E+01	180 Tot. 1.91E+04 1.33E+04 3.14E+03	180 Cps 3.36E+02 2.89E+02 3.70E+02	0.1 Delta 18 % 27.4 85.1 34.1	5.0 ± 18 (2s) %₀ 7.2 8.7 17.9	Delta 17 % 155.6 214.2 195.8	±17 (2s) ‰ 16.3 19.6 39.7
FR35 Hot Spot 3 Hot Spot 8 Hot Spot 10 Hot Spot 11	Sample Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer Hot Spot on Si Wafer	160 Tot. 8.71E+06 5.75E+06 1.42E+06 4.26E+06	160 Cps 1.54E+05 1.25E+05 1.68E+05 1.24E+05	170 Tot. 3.74E+03 2.59E+03 6.33E+02 1.85E+03	170 Cps 6.59E+01 5.64E+01 7.47E+01 5.38E+01	180 Tot. 1.91E+04 1.33E+04 3.14E+03 9.45E+03	180 Cps 3.36E+02 2.89E+02 3.70E+02 2.75E+02	0.1 Delta 18 % 27.4 85.1 34.1 41.7	5.0 ± 18 (2s) % 7.2 8.7 17.9 10.3	Delta 17 % 155.6 214.2 195.8 168.1	±17 (2s) % 16.3 19.6 39.7 23.3
FR35 Hot Spot 3 Hot Spot 8 Hot Spot 10 Hot Spot 11 Hot Spot 13 Hot Spot 15	Sample Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer Hot Spot on Si Wafer Hot Spot on Si Wafer Hot Spot on Si Wafer	160 Tot. 8.71E+06 5.75E+06 1.42E+06 4.26E+06 3.35E+06 2.18E+06	160 Cps 1.54E+05 1.25E+05 1.24E+05 9.33E+04 9.33E+04	170 Tot. 3.74E+03 2.59E+03 6.33E+02 1.85E+03 1.54E+03 1.54E+03	170 Cps 6.59E+01 5.64E+01 7.47E+01 5.38E+01 4.30E+01 2.85E+01	180 Tot. 1.91E+04 1.33E+04 3.14E+03 9.45E+03 7.75E+03	180 Cps 3.36E+02 2.89E+02 3.70E+02 2.75E+02 2.16E+02 1.06E+02	0.1 Delta 18 % 27.4 85.1 34.1 41.7 85.4 59.2	5.0 ± 18 (2s) % 7.2 8.7 17.9 10.3 11.4 14.3	Delta 17 %	±17 (2s) <sup>3</sup> / <sub>∞</sub> 16.3 19.6 39.7 23.3 25.4 22.0
FR35 Hot Spot 3 Hot Spot 8 Hot Spot 10 Hot Spot 11 Hot Spot 13 Hot Spot 15 Hot Spot 16	Sample Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im	Comments Comments Hot Spot on Si Wafer Hot Spot on Si Wafer	160 Tot. 8.71E+06 5.75E+06 1.42E+06 4.26E+06 2.18E+06 2.18E+06	160 Cps 1.54E+05 1.25E+05 1.25E+05 1.24E+05 1.24E+05 9.33E+04 8.59E+04 1.39E+05	170 Tot. 3.74E+03 2.59E+03 6.33E+02 1.85E+03 9.78E+02 1.91E+03	170 Cps 6.59E+01 5.64E+01 7.47E+01 5.38E+01 4.30E+01 3.85E+01 6.18E+01	180 Tot. 1.91E+04 1.33E+04 3.14E+03 9.45E+03 7.75E+03 4.92E+03 9.54E+03	180 Cps 3.36E+02 2.89E+02 3.70E+02 2.75E+02 2.16E+02 1.94E+02 3.09E+02	0.1 Delta 18 % 27.4 85.1 34.1 41.7 85.4 58.2 43.9	5.0 <b>± 18 (2s)</b> % 7.2 8.7 17.9 10.3 11.4 14.3 10.2	Delta 17 % 155.6 214.2 195.8 168.1 205.9 205.9 195.3	±17 (2s) %∞ 16.3 19.6 39.7 23.3 25.4 32.0 22.9
FR35 Hot Spot 3 Hot Spot 7 Hot Spot 10 Hot Spot 13 Hot Spot 13 Hot Spot 15 Hot Spot 15 Hot Spot 17	Sample Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer	160 Tot. 8.71E+06 5.75E+06 1.42E+06 4.26E+06 3.35E+06 2.18E+06 2.29E+06 2.79E+06	160 Cps 1.54E+05 1.25E+05 1.68E+05 1.24E+05 9.33E+04 8.59E+04 1.39E+05 5.33E+04	170 Tot. 3.74E+03 2.59E+03 6.33E+02 1.85E+03 1.54E+03 9.78E+02 1.91E+03 1.22E+03	170 Cps 6.59E+01 5.64E+01 7.47E+01 5.38E+01 4.30E+01 3.85E+01 6.18E+01 2.32E+01	180 Tot. 1.91E+04 1.33E+04 3.14E+03 9.45E+03 7.75E+03 4.92E+03 9.54E+03 6.25E+03	180 Cps 3.36E+02 2.89E+02 3.70E+02 2.75E+02 2.16E+02 1.94E+02 3.09E+02 1.19E+02	0.1 Delta 18 % 27.4 85.1 34.1 41.7 85.4 58.2 43.9 51.1	5.0 ± 18 (2s) % 7.2 8.7 17.9 10.3 11.4 14.3 10.2 12.7	Delta 17 %• 155.6 214.2 195.8 168.1 239.0 205.9 195.3 174.2	±17 (2s)
FR35 Hot Spot 3 Hot Spot 7 Hot Spot 10 Hot Spot 13 Hot Spot 13 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 17 Hot Spot 17 Hot Spot 21	Sample Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im	Comments Comments Hot Spot on Si Wafer Hot Spot on Si Wafer	160 Tot. 8.71E+06 5.75E+06 1.42E+06 4.26E+06 2.18E+06 2.18E+06 4.29E+06 9.50E+06	160 Cps 1.54E+05 1.25E+05 1.68E+05 1.24E+05 9.33E+04 8.59E+04 1.39E+05 5.33E+04 3.18E+04	170 Tot. 3.74E+03 2.59E+03 6.33E+02 1.85E+03 1.54E+03 9.78E+02 1.91E+03 1.22E+03 4.20E+03	170 Cps 6.59E+01 5.64E+01 7.47E+01 5.38E+01 4.30E+01 3.85E+01 6.18E+01 2.32E+01 1.41E+01	180 Tot. 1.91E+04 1.33E+04 3.14E+03 9.45E+03 7.75E+03 4.92E+03 9.54E+03 6.25E+03 2.20E+04	180 Cps 3.36E+02 2.89E+02 3.70E+02 2.75E+02 2.16E+02 1.94E+02 1.94E+02 1.19E+02 7.38E+01	0.1 Delta 18 % 27.4 85.1 34.1 41.7 85.4 58.2 43.9 51.1 89.4	5.0 ± 18 (2s) % 7.2 8.7 17.9 10.3 11.4 14.3 10.2 12.7 6.7	Delta 17 % 155.6 214.2 195.8 168.1 239.0 205.9 195.3 174.2 190.1	±17 (2s) %∞ 16.3 19.6 39.7 23.3 25.4 32.0 22.9 28.7 15.4
FR35 Hot Spot 3 Hot Spot 8 Hot Spot 10 Hot Spot 10 Hot Spot 11 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 17 Hot Spot 21 Hot Spot 22 Devidence 4 are 10	Sample Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer	160 Tot. 8.71E+06 5.75E+06 1.42E+06 4.26E+06 3.35E+06 2.18E+06 4.29E+06 9.50E+06 5.28E+06 5.28E+06	160 Cps 1.54E+05 1.25E+05 1.24E+05 1.24E+05 9.33E+04 1.39E+05 5.33E+04 3.18E+04 3.18E+04	170 Tot. 3.74E+03 2.59E+03 6.33E+02 1.85E+03 9.78E+02 1.91E+03 1.22E+03 4.20E+03 2.33E+03 8.59E+02	170 Cps 6.59E+01 5.64E+01 7.47E+01 5.38E+01 4.30E+01 3.85E+01 6.18E+01 2.32E+01 1.41E+01 1.37E+01	180 Tot. 1.91E+04 1.33E+04 3.14E+03 9.45E+03 9.45E+03 9.54E+03 9.54E+03 9.54E+03 9.52E+03 2.20E+04 1.20E+04 1.20E+04	180 Cps 3.36E+02 2.89E+02 3.70E+02 2.75E+02 2.75E+02 1.94E+02 3.09E+02 1.19E+02 7.38E+01 7.03E+01	0.1 Delta 18 % 27.4 85.1 34.1 41.7 85.4 58.2 43.9 51.1 89.4 64.1 70.2	5.0 ± 18 (2s) % 7.2 8.7 17.9 10.3 11.4 14.3 10.2 12.7 6.7 9.1 4.7	Delta 17 % 155.6 214.2 195.8 168.1 239.0 205.9 195.3 174.2 190.1 186.7 189.0	<ul> <li>s.1</li> <li>±17 (2s)</li> <li>‰</li> <li>16.3</li> <li>19.6</li> <li>39.7</li> <li>23.3</li> <li>25.4</li> <li>32.0</li> <li>22.9</li> <li>28.7</li> <li>15.4</li> <li>20.7</li> <li>10.8</li> </ul>
FR35 Hot Spot 3 Hot Spot 3 Hot Spot 10 Hot Spot 10 Hot Spot 11 Hot Spot 13 Hot Spot 15 Hot Spot 15 Hot Spot 16 Hot Spot 21 Hot Spot 16 Hot Spot 16 Hot Spot 15 Hot Spot 16 Hot Spot 16 Hot Spot 15 Hot Spot 16 Hot Spot 15 Hot Spot 16 Hot Spot 15 Hot Spot 16 Hot Spot 15 Hot Spot 16 Hot Spot 16 Hot Spot 15 Hot Spot 16 Hot Spot 16 Hot Spot 17 Hot Spot 21 Hot Spot 20 Hot Spot 21 Hot Spot 21 Hot Spot 20 Hot	Sample Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer On Si Wafer On Si Wafer	160 Tot. 8.71E+06 5.75E+06 3.35E+06 2.18E+06 4.29E+06 2.18E+06 4.29E+06 5.28E+06 5.28E+06 5.28E+06	160 Cps 1.54E+05 1.25E+05 1.25E+05 1.24E+05 9.33E+04 1.39E+05 5.33E+04 3.18E+04 3.18E+04 3.18E+04 3.05E+04	170 Tot. 3.74E+03 2.59E+03 6.33E+02 1.85E+03 9.78E+02 1.91E+03 1.22E+03 2.33E+03 8.59E+03 4.13E+03	170 Cps 6.59E+01 5.64E+01 7.47E+01 5.38E+01 4.30E+01 3.85E+01 6.18E+01 2.32E+01 1.34E+01 1.37E+01 2.73E+01	180 Tot. 1.91E+04 1.33E+04 3.14E+04 3.14E+04 9.45E+03 9.45E+03 9.45E+03 9.54E+03 6.25E+03 2.20E+04 1.20E+04 1.20E+04 1.20E+04	180 Cps 3.36E+02 2.89E+02 3.70E+02 2.75E+02 2.16E+02 1.94E+02 3.09E+02 1.19E+02 7.38E+01 7.38E+01 7.38E+01 7.38E+01 6.87E+01 6.87E+01	Delta 18 % 27.4 85.1 34.1 41.7 85.4 58.2 43.9 51.1 89.4 64.1 79.2 57.3	5.0 ± 18 (2s) %₀ 7.2 8.7 17.9 10.3 11.4 14.3 10.2 12.7 6.7 9.1 4.7 6.8	Delta 17 %• 155.6 214.2 195.8 168.1 239.0 205.9 195.3 174.2 190.1 186.7 186.7 186.7 187.9	<ul> <li>s.1</li> <li>±17 (2s)</li> <li>‰</li> <li>16.3</li> <li>19.6</li> <li>39.7</li> <li>23.3</li> <li>25.4</li> <li>32.0</li> <li>22.9</li> <li>28.7</li> <li>15.4</li> <li>20.7</li> <li>10.8</li> <li>15.6</li> </ul>
FR35 Hot Spot 3 Hot Spot 10 Hot Spot 10 Hot Spot 10 Hot Spot 13 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 21 Hot Spot 22 Randomm Area 10 Randomm Area 12	Sample Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer On Si Wafer On Si Wafer	160 Tot. 8.71E+06 5.75E+06 1.42E+06 4.26E+06 3.35E+06 2.79E+06 4.29E+06 2.79E+06 9.50E+06 1.94E+07 9.60E+06 1.65E+07	160 Cps 1.54E+05 1.25E+05 1.24E+05 1.24E+05 1.24E+05 9.33E+04 8.59E+04 3.10E+04 6.18E+04 3.05E+04 5.24E+04	170 Tot. 3.74E+03 2.59E+03 6.33E+02 1.54E+03 9.78E+02 1.91E+03 1.22E+03 4.20E+03 8.59E+03 4.13E+03 7.43E+03	170 Cps 6.59E+01 5.64E+01 7.47E+01 5.38E+01 4.30E+01 2.32E+01 1.41E+01 2.32E+01 1.31E+01 2.32E+01	180 Tot. 1.91E+04 1.33E+04 3.14E+03 9.45E+03 9.54E+03 6.25E+03 2.0E+04 4.47E+04 2.16E+04 3.83E+04	180 Cps 3.36E+02 2.89E+02 3.70E+02 2.75E+02 2.16E+02 1.94E+02 3.09E+02 1.19E+02 7.38E+01 1.42E+02 6.87E+01 1.22E+02	Delta 18 % 27.4 85.1 34.1 41.7 85.4 58.2 43.9 51.1 89.4 64.1 79.2 57.3 91.2	5.0 ± 18 (2s) % 7.2 8.7 17.9 10.3 11.4 14.3 10.2 12.7 6.7 9.1 4.7 6.8 5.1	Delta 17 % 155.6 214.2 195.8 168.1 239.0 205.9 195.3 174.2 190.1 186.7 188.9 157.9 213.5	<ul> <li>s.1</li> <li>±17 (2s)</li> <li>‰</li> <li>16.3</li> <li>19.6</li> <li>39.7</li> <li>23.3</li> <li>25.4</li> <li>32.0</li> <li>22.9</li> <li>28.7</li> <li>15.4</li> <li>20.7</li> <li>10.8</li> <li>15.6</li> <li>11.6</li> </ul>
FR35 Hot Spot 3 Hot Spot 8 Hot Spot 10 Hot Spot 10 Hot Spot 13 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 17 Hot Spot 22 Randomm Area 10 Randomm Area 13	Sample Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer On Si Wafer On Si Wafer On Si Wafer	160 Tot. 8.71E+06 5.75E+06 1.42E+06 4.26E+06 3.35E+06 2.18E+06 2.18E+06 2.18E+06 2.18E+06 2.52E+06 1.52E+07 1.65E+07 1.43E+07	160 Cps 1.54E+05 1.25E+05 1.24E+05 1.24E+05 9.33E+04 8.59E+04 3.10E+04 3.10E+04 3.10E+04 4.54E+04 4.54E+04	170 Tot. 3.74E+03 2.59E+03 1.54E+03 9.78E+02 1.85E+03 1.22E+03 4.20E+03 2.33E+03 8.59E+03 4.13E+03 7.43E+03 7.43E+03	170 Cps 6.59E+01 5.54E+01 7.47E+01 5.38E+01 4.30E+01 3.38E+01 2.32E+01 1.41E+01 1.37E+01 1.37E+01 1.37E+01 1.37E+01 1.37E+01	180           Tot.           1.91E+04           1.33E+04           3.14E+03           9.45E+03           7.75E+03           4.92E+03           6.25E+03           2.20E+04           1.20E+04           1.20E+04           3.83E+04           3.83E+04           3.83E+04	180 Cps 3.36E+02 2.89E+02 3.70E+02 2.75E+02 2.16E+02 1.94E+02 3.09E+02 1.19E+02 7.38E+01 7.38E+01 1.42E+02 6.87E+01 1.22E+02	Delta 18 % 27.4 85.1 34.1 41.7 85.4 34.9 51.1 89.4 64.1 79.2 57.3 91.2 37.2	5.0 ± 18 (2s) % 7.2 8.7 17.9 10.3 11.4 14.3 10.2 12.7 6.7 9.1 4.7 6.7 9.1 4.7 5.6	Delta 17 % 155.6 214.2 195.8 168.1 239.0 205.9 195.3 174.2 190.1 186.7 188.9 157.9 213.5 129.5	*.1 *17 (2s) % 16.3 19.6 39.7 23.3 25.4 32.0 22.9 28.7 15.4 20.7 10.8 15.6 11.6 11.6 12.9
FR35 Hot Spot 3 Hot Spot 8 Hot Spot 10 Hot Spot 10 Hot Spot 11 Hot Spot 13 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 21 Hot Spot 21 Randomm Area 10 Randomm Area 13 Randomm Area 14	Sample Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer On Si Wafer On Si Wafer On Si Wafer On Si Wafer On Si Wafer	160 Tot. 8.71E+06 5.75E+06 1.42E+06 2.18E+06 2.35E+06 2.35E+06 2.35E+06 9.50E+06 5.28E+06 1.94E+07 9.60E+06 1.65E+07 1.43E+07 1.43E+07	160 Cps 1.54E+05 1.25E+05 1.24E+05 9.33E+04 8.59E+04 3.18E+04 3.18E+04 3.18E+04 3.18E+04 3.18E+04 4.36E+04 5.24E+04 5.24E+04 5.34E+04	170 Tot. 3.74E+03 2.59E+03 6.33E+02 1.85E+03 1.54E+03 9.78E+02 1.91E+03 1.22E+03 4.20E+03 2.33E+03 8.59E+03 4.13E+03 6.00E+03 6.00E+03 6.00E+03	170 Cps 6.59E+01 5.64E+01 7.47E+01 5.38E+01 4.30E+01 3.85E+01 6.18E+01 2.32E+01 1.31E+01 2.32E+01 1.31E+01 2.36E+01 1.91E+01 2.16E+01 2.36E+01	180 Tot. 1.91E+04 1.33E+04 3.14E+03 9.45E+03 7.75E+03 4.92E+03 9.54E+03 6.25E+03 2.20E+04 1.20E+04 4.47E+04 2.16E+04 3.81E+04 3.16E+04 3.16E+04	180 Cps 3.36E+02 2.89E+02 3.70E+02 2.75E+02 2.16E+02 2.30E+02 1.94E+02 3.09E+02 1.19E+02 7.38E+01 7.03E+01 1.42E+02 6.87E+01 1.22E+02 1.100E+02 1.15E+02 1.46E+03	0.1 Delta 18 % 27.4 85.1 34.1 41.7 85.4 58.2 43.9 51.1 89.4 64.1 179.2 57.3 91.2 37.2 51.2 37.2 51.2 37.2 51.2 37.2 51.2 37.2 51.2 37.2 51.3 57.3 57.3 57.2 57.2 57.2 57.3 57.2 57.3 57.2 57.2 57.3 57.2 57.2 57.3 57.2 57.2 57.3 57.2 57.3 57.2 57.2 57.3 57.2 57.2 57.3 57.2 57.2 57.3 57.2 57.2 57.3 57.2 57.2 57.2 57.3 57.2 57.2 57.2 57.2 57.3 57.2 57.2 57.2 57.2 57.3 57.2 57.2 57.2 57.2 57.3 57.2 57.2 57.2 57.2 57.2 57.2 57.2 57.3 57.2	5.0 ± 18 (2s) % 7.2 8.7 17.9 10.3 11.4 14.3 10.2 12.7 6.7 9.1 4.7 6.8 5.1 5.6 5.3 4.4	Delta 17 % 155.6 214.2 195.8 168.1 239.0 205.9 195.3 174.2 190.1 186.9 157.9 213.5 129.5 131.6	*.1 *17 (2s) % 16.3 19.6 39.7 23.3 25.4 32.0 22.9 28.7 15.4 20.7 10.8 15.6 11.6 12.9 12.1 0.0 12.1 12.1 15.4 15.6 15.4 15.6
FR35 Hot Spot 3 Hot Spot 3 Hot Spot 10 Hot Spot 10 Hot Spot 11 Hot Spot 13 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 22 Randomm Area 10 Randomm Area 13 Randomm Area 13 Randomm Area 14 Randomm Area 16	Sample Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer On Si Wafer	160 Tot. 8.71E+06 5.75E+06 1.42E+06 4.26E+06 2.78E+06 2.78E+06 2.78E+06 5.28E+06 1.94E+07 9.50E+06 1.54E+07 1.43E+07 1.43E+07 1.61E+07 2.38E+07	160 Cps 1.54E+05 1.25E+05 1.24E+05 9.33E+04 1.39E+04 3.318E+04 3.18E+04 3.18E+04 3.05E+04 5.33E+04 5.24E+04 4.54E+04 5.34E+04 5.34E+04	170 Tot. 3.74E+03 2.59E+03 6.33E+02 1.85E+03 1.54E+03 9.78E+02 1.91E+03 1.22E+03 2.33E+03 8.413E+03 7.43E+03 6.79E+03 1.03E+04 2.73E+03	170 Cps 6.59E+01 5.64E+01 7.47E+01 5.53E+01 3.85E+01 3.85E+01 1.32E+01 1.37E+01 2.32E+01 1.37E+01 2.32E+01 1.31E+01 2.36E+01 3.26E+01 3.26E+01	180 Tot. 1.91E+04 1.33E+04 3.14E+03 9.45E+03 7.75E+03 9.54E+03 6.25E+03 2.20E+04 1.20E+04 4.47E+04 4.47E+04 4.47E+04 3.83E+04 3.61E+04 5.24E+04 1.47E+04	180 Cps 3.36E+02 2.89E+02 3.70E+02 2.16E+02 1.19E+02 7.38E+01 7.03E+01 1.42E+02 6.87E+01 1.22E+02 1.05E+02 1.15E+02 1.66E+02 4.68E+01	0.1 Delta 18 % 27.4 85.1 34.1 41.7 85.4 58.2 43.9 51.1 89.4 64.1 79.2 57.3 91.2 37.2 51.2 31.7 127.9	3.0 ± 18 (2s) %₀ 7.2 8.7 17.9 10.3 11.4 14.3 10.2 12.7 9.1 4.7 9.1 4.7 6.8 5.1 5.6 5.3 4.4 8.2	Delta 17 % 155.6 214.2 195.8 168.1 239.0 205.9 195.3 174.2 190.1 186.7 190.1 186.7 157.9 213.5 129.5 131.6 157.4	a.1 ±17 (2s) %a 16.3 19.6 39.7 23.3 25.4 32.0 22.9 28.7 15.4 20.7 15.4 20.7 15.4 20.7 15.4 20.7 15.4 20.7 21.5 15.4 20.7 21.5
FR35 Hot Spot 3 Hot Spot 8 Hot Spot 10 Hot Spot 10 Hot Spot 13 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 22 Randomm Area 10 Randomm Area 12 Randomm Area 13 Randomm Area 15 Randomm Area 15 Randomm Area 17	Sample Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer On Si Wafer	160 Tot. 8.71E+06 5.75E+06 1.42E+06 4.26E+06 2.78E+06 2.78E+06 2.78E+06 2.79E+06 9.50E+06 1.94E+07 9.52E+07 1.43E+07 1.45E+07 1.45E+07 2.38E+07 6.13E+06	160 Cps 1.54E+05 1.25E+05 1.25E+05 1.24E+05 5.33E+04 8.59E+04 1.39E+05 5.33E+04 3.18E+04 3.18E+04 3.05E+04 3.05E+04 7.58E+04 1.55E+04 3.40E+04	1322F04 170 Tot. 3.74E+03 2.59E+03 6.33E+02 1.85E+03 1.54E+03 9.78E+02 1.91E+03 2.233E+03 4.20E+03 2.33E+03 4.32E+03 4.32E+03 1.03E+04 2.73E+03 4.80E+03 1.03E+04 2.73E+03 4.80E+03 1.03E+04 1.03E	170 Cps 6.59E+01 5.64E+01 7.47E+01 5.38E+01 4.30E+01 3.35E+01 6.18E+01 1.32E+01 1.32E+01 1.37E+01 1.37E+01 1.31E+01 3.26	180 Tot. 1.91E+04 1.33E+04 3.14E+03 9.45E+03 7.75E+03 4.92E+03 9.54E+03 2.20E+04 4.76E+04 2.20E+04 4.76E+04 3.36E+04 3.36E+04 3.36E+04 5.24E+04 1.47E+04 2.52E+04	180 Cps 3.36E+02 2.89E+02 3.70E+02 2.75E+02 2.75E+02 2.16E+02 1.94E+02 3.09E+02 7.38E+01 1.42E+02 6.87E+01 1.42E+02 6.87E+01 1.15E+02 1.66E+02 1.66E+02 1.66E+02	0.1 Delta 18 % 27.4 85.1 34.1 85.4 35.4 35.4 35.4 35.4 35.4 35.4 36.4 39.9 51.1 89.4 64.1 79.2 57.3 91.2 37.2 31.7 127.9 105.3	5.0 ± 18 (2s) % 7.2 8.7 17.9 10.3 11.4 14.3 10.2 12.7 6.7 9.1 4.7 6.8 5.1 5.6 8 5.1 5.6 8 5.3 4.4 8.2 6.3	Delta 17 % 155.6 214.2 195.8 168.1 239.0 205.9 195.3 174.2 190.1 186.7 188.9 157.9 157.9 157.5 129.5 131.6 157.4 197.4 197.4	a.1 <b>±17 (2s)</b> %• 16.3 19.6 39.7 23.3 25.4 32.0 22.9 28.7 15.4 20.7 10.8 15.6 11.6 12.9 9.9 19.1 14.4
FR35 Hot Spot 3 Hot Spot 8 Hot Spot 10 Hot Spot 10 Hot Spot 13 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 22 Randomm Area 10 Randomm Area 13 Randomm Area 13 Randomm Area 15 Randomm Area 17 Randomm Area 17 Randomm Area 18	Sample Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer On Si Wafer	160 Tot. 8.71E+06 5.75E+06 1.42E+06 4.26E+06 4.26E+06 4.26E+06 4.26E+06 4.29E+06 2.79E+06 5.28E+06 1.55E+07 1.61E+07 2.38E+07 1.61E+07 6.13E+06 6.13E+06 1.07E+07 1.21E+07	160 Cps 1.54E+05 1.25E+05 1.25E+05 1.25E+05 1.24E+05 9.33E+04 3.38E+04 3.18E+04 3.18E+04 3.18E+04 3.38E+04 5.34E+04 4.54E+04 4.54E+04 1.54E+05	170 Tot. 3.74E+03 2.59E+03 6.33E+02 1.54E+03 9.78E+02 1.54E+03 9.78E+02 2.33E+03 8.59E+03 4.13E+03 6.00E+03 6.00E+03 1.03E+04 2.33E+03 4.80E+03 5.34E+03	170 Cps 6.59E+01 5.64E+01 7.47E+01 5.38E+01 4.30E+01 3.385E+01 1.338E+01 1.338E+01 1.338E+01 1.33E+01 2.32E+01 1.31E+01 2.36E+01 3.26E+01 8.67E+00 8.67E+00 1.53E+01	180 Tot. 1.91E+04 1.31E+04 3.14E+03 3.14E+03 9.45E+03 9.54E+03 6.25E+03 2.20E+04 1.20E+04 3.16E+04 3.16E+04 3.16E+04 3.16E+04 1.31E+04 2.52E+04 2.52E+04 2.50E+04	180 Cps 3.36E+02 2.89E+02 3.70E+02 3.70E+02 3.09E+02 3.09E+02 1.194E+02 3.09E+02 1.194E+02 6.87E+01 1.42E+02 6.87E+01 1.42E+02 6.87E+01 1.5E+02 1.66E+02 4.66E+01 8.01E+01 8.90E+01	0.1 Delta 18 ∞ 27.4 85.1 34.1 41.7 85.4 43.9 51.1 89.4 64.1 79.2 57.3 91.2 37.2 51.2 31.7 127.9 105.3 84.6	3.0 ± 18 (2s) % 7.2 8.7 17.9 10.3 11.4 14.3 10.2 12.7 6.7 9.1 4.7 6.8 5.1 5.6 5.3 4.4 8.2 6.3 6.0	Delta 17 % 155.6 214.2 195.8 168.1 239.0 205.9 195.3 174.2 190.1 186.7 190.1 186.7 188.9 157.9 213.5 129.5 131.6 157.4 197.6 205.5 184.2	a.1 ±17 (2s) %a 16.3 19.6 39.7 23.3 25.4 32.0 28.7 15.4 20.7 28.7 15.4 20.7 28.7 15.4 20.7 28.7 15.4 20.7 29.7 10.8 15.6 11.6 12.9 12.9 12.9 19.1 14.4 13.7 13.7 14.6 14.6 15.6 14.6 14.6 14.6 14.6 15.6
FR35 FR35 Hot Spot 3 Hot Spot 8 Hot Spot 10 Hot Spot 10 Hot Spot 11 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 17 Hot Spot 21 Hot Spot 21 Randomm Area 10 Randomm Area 13 Randomm Area 13 Randomm Area 15 Randomm Area 16 Randomm Area 18 Randomm Area 19 Randomm Area 18 Randomm Area 18 Randomm Area 18 Randomm Area 19 Randomm Area 18 Randomm Area 18 Randomm Area 19 Randomm Area 18 Randomm Area 19 Randomm Area 18 Randomm Area 18 Randomm Area 19 Randomm Area 18 Randomm Area 18 Randomm Area 19 Randomm Area 18 Randomm Area 19 Randomm Area 18 Randomm Area 19 Randomm Area 19 Randomm Area 18 Randomm Area 19 Randomm Area 19 Random	Sample Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer On Si Wafe	160 Tot. 8.71E+06 5.75E+06 1.42E+06 4.26E+06 4.26E+06 4.26E+06 4.29E+06 4.29E+06 5.28E+06 5.28E+06 5.28E+06 5.28E+06 1.94E+07 1.61E+07 2.38E+07 6.13E+06 1.07E+07 1.01E+07 1.21E+07	160 Cps 1.54E+05 1.25E+05 1.24E+05 9.33E+04 1.39E+05 5.33E+04 3.05E+04 3.05E+04 5.24E+04 4.54E+04 4.54E+04 4.54E+04 1.55E+04 1.55E+04 3.365E+045E+055E+055E+040E+055E+	170 Tot. 3.74E+03 2.59E+03 6.33E+02 1.54E+03 9.78E+02 1.91E+03 1.22E+03 2.33E+03 8.59E+03 8.59E+03 4.32E+03 6.00E+03 5.73E+03 4.80E+03 5.34E+03 4.54E+03 5.34E+03	170 Cps 6.59E+01 5.64E+01 7.47E+01 5.38E+01 4.30E+01 3.38E+01 6.18E+01 2.32E+01 1.37E+01 2.32E+01 1.37E+01 2.36E+01 1.31E+01 2.36E+01 2.36E+01 1.51E+01 8.67E+00 8.67E+00 1.53E+01 1.70	180 Tot. 1.91E+04 1.31E+04 3.14E+03 9.45E+03 9.45E+03 9.45E+03 9.5E+03 2.20E+04 4.92E+03 2.20E+04 4.47E+04 3.16E+04 3.16E+04 3.16E+04 3.16E+04 4.31E+04 4.31E+04 4.32E+04 4.32E+04 4.32E+04 4.32E+04 3.16E+0	180 Cps 3.36E+02 2.89E+02 3.70E+02 2.75E+02 2.16E+02 1.94E+02 3.09E+02 3.09E+02 3.09E+02 1.19E+02 3.09E+02 1.42E+02 1.5E+02 1.66E+02 4.68E+01 8.01E+01 8.90E+01 7.45E+01 7.45E+01	0.1 Delta 18 % 27.4 85.1 34.1 41.7 85.4 43.9 51.1 89.4 64.1 79.2 57.3 91.2 57.3 91.2 57.2 51.2 37.2 51.2 31.7 127.9 105.3 84.6 67.7	3.0 ± 18 (2s) % 7.2 8.7 17.9 10.3 11.4 10.2 12.7 9.1 4.7 6.8 5.1 5.6 5.3 4.4 8.2 6.3 6.0 6.5 -	Delta 17 % 155.6 214.2 195.8 168.1 239.0 205.9 195.3 174.2 190.1 186.7 188.9 213.5 129.5 131.6 157.4 197.6 205.5 131.6 157.4 197.6 205.5 184.2 205.5 184.2 205.5 184.2 205.5 2	<ul> <li>a.1</li> <li>a.1</li> <li>a.1</li> <li>a.1</li> <li>a.1</li> <li>b.3</li> <li>a.9.6</li> <li>a.9.7</li> <li>a.3.3</li> <li>a.2.0</li> <li>a.2.9</li> <li>a.2.0</li> <li>a.2.0</li></ul>
FR35 FR35 Hot Spot 3 Hot Spot 10 Hot Spot 10 Hot Spot 11 Hot Spot 13 Hot Spot 15 Hot Spot 15 Hot Spot 22 Randomm Area 10 Randomm Area 12 Randomm Area 13 Randomm Area 14 Randomm Area 14 Randomm Area 18 Randomm Area 18 Randomm Area 18 Randomm Area 18 Randomm Area 18 Randomm Area 18 Randomm Area 19 Randomm Area 20 Randomm Area 21	Sample Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer On Si Wafer O	160 Tot. 8.71E+06 5.75E+06 1.42E+06 4.26E+06 3.35E+06 2.18E+06 5.28E+06 5.28E+06 1.54E+07 9.50E+06 5.28E+07 1.43E+07 1.43E+07 1.61E+07 2.38E+07 6.13E+06 1.07E+07 1.21E+07 1.32E+07 1.3	160 Cps 1.54E+05 1.25E+05 1.28E+05 1.24E+05 9.33E+04 8.59E+04 1.39E+05 5.33E+04 3.18E+04 3.18E+04 3.18E+04 5.33E+04 3.05E+04 3.05E+04 3.40E+04 3.40E+04 3.40E+04 3.40E+04 3.28E+04 2.41E+04 1.41E+04 1.41E+04 1.41E+04 1.41E+04 1.41E+04 1.41E+04 1.41E+04 1.41E+04 1.41E+04 1.41E+04 1.41E+05 1.41E+05 1.42E+04 1.42E+04 1.44E+04E+04 1.44E+04 1.44E+04 1.44E+04 1.44E+04 1.44E+04 1.44E+040	170 Tot. 3.74E+03 2.59E+03 6.33E+02 1.54E+03 9.78E+02 9.78E+02 9.78E+02 2.33E+03 1.22E+03 4.20E+03 2.33E+03 6.39E+03 1.03E+04 4.33E+03 6.09E+03 1.03E+04 4.80E+03 5.458E+03 3.63E+03 1.63E+03 1.63E+03 5.458E+03 3.63E+03 1.63E+03E+03E+03E+03E+03E+03E+03E+03E+03E+0	170 Cps 6.59E+01 5.64E+01 7.47E+01 3.53E+01 3.38E+01 3.38E+01 3.38E+01 2.32E+01 1.37E+01 2.32E+01 1.37E+01 2.36E+01 3.26E+01 3.26E+01 3.26E+01 1.53E+01 1.53E+01 1.55E+01 6.63E+00	180 Tot. 1.91E+04 1.31E+03 3.14E+03 9.45E+03 9.45E+03 4.92E+03 6.25E+03 2.20E+04 1.20E+04 1.20E+04 1.32E+04 3.61E+04 2.24E+04 1.47E+04 2.34E+04 1.47E+04 2.34E+04 1.34E+	180 Cps 3.36E+02 2.89E+02 3.70E+02 2.75E+02 2.75E+02 2.16E+02 1.94E+02 7.38E+01 7.03E+01 7.03E+01 7.03E+01 7.03E+01 7.03E+02 1.66E+02 4.68E+01 8.01E+01 8.01E+01 8.01E+01 5.68E+01 5.68E+01 5.03E+02	0.1 Delta 18 % 27.4 85.1 34.1 41.7 85.4 58.4 58.4 58.4 59.4 64.1 79.2 37.2 51.2 31.7 21.2 31.7 12.7 9 105.3 84.6 67.7 105.8 149.1	3.0 ± 18 (2s) %₀ 7.2 8.7 17.9 10.3 11.4 14.3 10.2 12.7 9.1 4.7 9.1 4.7 9.1 4.7 5.6 5.3 4.4 8.2 6.3 6.0 6.5 7.5 9.9	Delta 17 % 155.6 214.2 195.8 168.1 239.0 205.9 195.3 174.2 195.3 174.2 186.7 188.7 213.5 129.5 131.6 157.4 197.6 205.5 184.2 205.5 184.3 286.6 216.1 194.3 286.6 216.1 194.3 286.6 216.1 194.3 286.6 216.1 2	a.1 ±17 (2s) %a 16.3 19.6 39.7 23.3 25.4 32.0 22.9 28.7 10.8 15.6 11.6 12.1 9.9 12.1 9.9 19.1 14.4 13.7 14.8 16.6 22.9
FR35 Hot Spot 3 Hot Spot 8 Hot Spot 10 Hot Spot 10 Hot Spot 10 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 22 Randomm Area 10 Randomm Area 12 Randomm Area 13 Randomm Area 15 Randomm Area 15 Randomm Area 17 Randomm Area 18 Randomm Area 19 Randomm Area 20 Randomm Area 20	Sample           Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer On Si Wafe	160 Tot. 8.71E+06 5.75E+06 1.42E+06 3.35E+06 2.18E+06 9.50E+06 9.50E+06 9.50E+06 9.50E+06 9.50E+06 9.50E+06 1.94E+07 1.65E+07 1.65E+07 2.38E+07 1.61E+07 1.21E+07 1.21E+07 1.21E+07 1.21E+07 1.35E+07 1.3	160 Cps 1.54E+05 1.25E+05 1.25E+05 1.24E+05 9.33E+04 8.59E+04 3.18E+04 3.18E+04 3.18E+04 3.18E+04 3.18E+04 3.18E+04 7.58E+04 1.52E+04 3.32E+04 1.52E+04 3.32E+04 1.52E+04 3.32E+04 1.54E+05 3.32E+04 1.54E+05 3.32E+04 1.54E+05 3.32E+04 1.54E+05 3.32E+04 3.32E+05 3.32E+04 3.32E+05 3.32E+04 3.32E+05 3.32E+04 3.32	170 Tot. 3.74E+03 2.59E+03 6.33E+02 1.54E+03 9.78E+02 1.91E+03 1.22E+03 4.20E+03 2.33E+03 4.23E+03 4.23E+03 4.365H-03 5.34E+03 5.36E+03 1.03E+04 2.35E+03 5.36E+03 1.03E+04 2.362E+03 5.36E+03 1.03E+04 2.362E+03 5.36E+03 1.03E+04 2.362E+03 5.36E+03 1.03E+04 2.362E+032E+03 2.362E+03 2.362E+03 2.362E+032E+032	170 Cps 6.59E+01 5.64E+01 7.47E+01 5.38E+01 4.30E+01 5.38E+01 4.30E+01 3.38E+01 1.31E+01 2.32E+01 1.31E+01 2.36E+01 1.91E+01 2.36E+01 1.92E+01 1.52E+01 1.45E+01 1.15E+01 1.15E+01 0.08E+01	180 Tot. 1.91E+04 1.31E+04 3.14E+03 9.45E+03 9.45E+03 9.54E+03 9.54E+03 9.54E+03 9.54E+03 9.54E+04 2.25E+04 1.36E+04 3.61E+04 3.61E+04 3.61E+04 2.52E+04 1.36E+04 2.52E+04 1.36E+04 2.52E+04 1.36E+04 2.52E+04 1.36E+04 2.52E+04 1.36E+04 1.36E+04 2.52E+04 1.36E+04 2.52E+04 1.36E+04 2.52E+04 1.36E+04 2.52E+04 1.36E+04 2.52E+04 1.36E+04 2.52E+04 1.36E+04 2.52E+04 1.36E+04 1.36E+04 1.36E+04 1.36E+04 1.26E+	180 Cps 3.36E+02 2.89E+02 3.70E+02 2.75E+02 2.75E+02 2.76E+02 1.94E+02 1.94E+02 7.38E+01 7.03E+01 1.42E+02 6.87E+01 1.52E+02 1.66E+02 1.66E+02 1.66E+02 1.66E+02 1.568E+01 8.01E+01 8.01E+01 8.01E+01 3.27E+01 3.568E+01 3.569E+01	0.1 Delta 18 % 27.4 85.1 34.1 41.7 85.4 43.9 51.1 89.4 64.1 79.2 57.3 37.2 51.2 37.2 51.2 37.2 51.2 31.7 127.9 105.3 84.6 67.7 105.8 149.4 156.4	3.0 ± 18 (2s) % 7.2 8.7 17.9 10.3 11.4 14.3 10.2 12.7 6.7 9.1 4.7 6.8 5.1 5.6 5.3 4.4 8.2 6.3 6.0 6.5 7.5 9.9 7.5	Delta 17 % 155.6 214.2 145.8 168.1 239.0 205.9 195.3 174.2 190.1 186.7 174.2 190.1 186.9 157.9 213.5 131.6 157.4 197.5 134.6 157.4 197.5 184.2 196.5 184.2 196.5 184.2 196.5 184.2 196.5 184.2 196.5 196.	a.1 <b>±17 (2s)</b> % 16.3 19.6 39.7 23.3 25.4 20.7 15.4 20.7 10.8 15.6 11.6 11.6 12.9 19.1 19.1 19.9 19.1 14.1 13.7 14.8 16.6 22.9 19.1 14.1 15.7 14.1 15.4 15.
FR35 Hot Spot 3 Hot Spot 8 Hot Spot 10 Hot Spot 10 Hot Spot 13 Hot Spot 13 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 17 Hot Spot 22 Randomm Area 10 Randomm Area 13 Randomm Area 13 Randomm Area 15 Randomm Area 18 Randomm Area 18 Randomm Area 21 Randomm Area 21	Sample Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer On Si	160 Tot. 8.71E+06 5.75E+06 1.42E+06 4.26E+06 4.26E+06 4.26E+06 4.29E+06 2.38E+06 5.28E+06 1.55E+07 1.61E+07 9.50E+06 1.65E+07 1.61E+07 1.61E+07 2.38E+07 6.13E+06 6.13E+06 6.13E+06 1.07E+07 1.31E+07 7.59E+06 4.20E+06 4.20E+06 7.27E+06 7.26E+06	160 Cps 1.54E+05 1.25E+05 1.25E+05 1.25E+05 1.24E+05 9.33E+04 1.34E+04 3.18E+04 3.18E+04 3.18E+04 3.34E+04 4.54E+04 4.54E+04 4.54E+04 4.54E+04 1.35E+04 3.35E+04 3.35E+04 2.34E+04 1.34E+04 1.34E+04 2.31E+04 2.31E+04 2.36E+04 2.36E+04	170 Tot. 3.74E+03 2.59E+03 6.33E+02 1.54E+03 9.78E+02 1.54E+03 9.78E+02 2.33E+03 8.59E+03 1.22E+03 4.32E+03 6.09E+03 1.03E+04 2.33E+03 6.09E+03 1.03E+04 2.34E+03 4.86E+03 3.63E+03 3.63E+03 3.56E+03	170 Cps 6.59E+01 5.64E+01 7.47E+01 5.38E+01 4.30E+01 3.385E+01 1.31E+01 2.32E+01 1.31E+01 2.32E+01 1.31E+01 2.36E+01 3.26E+01 8.67E+00 1.52E+01 1.52E+01 1.52E+01 1.52E+01 1.52E+01 1.55E+01 1.5	180 Tot. 1.91E+04 1.31E+03 3.14E+03 3.14E+03 9.54E+03 6.25E+03 4.32E+03 6.25E+03 3.62E+04 3.62E+04 3.83E+04 3.61E+04 2.62E+04 3.83E+04 1.61E+04 2.52E+04 2.52E+04 1.34E+04 1.72E+04 1.33E+04 1.79E+04 1.88E+	180 Cps 3.36E+02 2.89E+02 3.70E+02 2.75E+02 2.75E+02 2.75E+02 2.16E+02 1.94E+02 3.09E+02 1.19E+02 6.87E+01 1.42E+02 6.87E+01 1.42E+02 4.66E+02 4.66E+02 4.66E+01 8.01E+01 8.01E+01 3.27E+01 3.68E+01 3.69E+01 3.598E+01	0.1 Delta 18 % 27.4 85.1 34.1 41.7 85.4 43.9 51.1 89.4 64.1 79.2 57.3 91.2 57.3 91.2 57.3 91.2 57.3 91.2 57.3 91.2 57.3 91.2 57.3 91.7 127.9 105.7 1	5.0 ★ 18 (2s) % 7.2 8.7 17.9 10.3 11.4 14.3 10.2 12.7 6.7 9.1 4.7 6.8 5.1 5.6 5.3 4.4 8.2 6.3 6.0 6.5 9.9 7.5 7.3	Delta 17 % 155.6 214.2 195.8 168.1 239.0 205.9 195.3 174.2 190.1 186.7 190.1 186.7 190.1 186.7 190.1 186.7 190.1 186.7 190.5 131.6 157.4 197.6 205.5 184.2 197.6 205.5 184.2 197.6 205.6 216.1 286.6 216.1 286.6 216.1 286.6 216.1 286.6 216.1 286.6 216.1 286.6 216.1 286.6 216.1 286.6 216.1 286.7 287.5 297.5 287.5 297.5 2	a.1 <b>±17 (2s)</b> <b>%</b> 16.3 19.6 39.7 23.3 25.4 20.7 15.4 20.7 15.4 20.7 15.4 20.7 15.4 20.7 15.4 20.7 15.4 20.7 15.4 20.7 15.4 20.9 12.9 12.1 9.9 19.1 14.8 16.6 22.9 17.1 16.9 17.7 16.9 17.7 16.6 17.7 17
FR35 FR35 Hot Spot 3 Hot Spot 10 Hot Spot 10 Hot Spot 11 Hot Spot 13 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 21 Randomm Area 10 Randomm Area 13 Randomm Area 13 Randomm Area 15 Randomm Area 16 Randomm Area 18 Randomm Area 21 Randomm Area 21 Randomm Area 23 Randomm Area 23 Randomm Area 24 	Sample Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer On Si Wafe	160 Tot. 8.71E+06 5.75E+06 1.42E+06 4.26E+06 4.29E+06 4.29E+06 9.50E+06 9.50E+06 9.50E+06 1.94E+07 1.43E+07 1.43E+07 1.43E+07 1.43E+07 1.43E+07 1.43E+07 1.43E+07 1.43E+07 1.43E+07 1.43E+07 1.43E+07 1.43E+07 1.43E+07 1.43E+07 1.43E+06 1.72E+07 1.43E+06 1.72E+07 1.43E+06 1.72E+07 1.43E+06 1.72E+07 1.43E+07 1.43E+07 1.43E+07 1.43E+06 1.72E+07 1.43E+07 1.4	160 Cps 1.54E+05 1.25E+05 1.25E+05 1.24E+05 9.33E+04 1.39E+05 5.33E+04 3.18E+04 3.18E+04 3.18E+04 4.54E+04 4.54E+04 4.54E+04 3.365E+043.365E+055E+055E+055E	170 Tot. 3.74E+03 2.99E+03 6.33E+02 1.54E+03 9.78E+02 1.91E+03 1.22E+03 4.20E+03 2.33E+03 8.59E+03 2.33E+03 6.09E+03 1.03E+04 4.203E+03 4.88E+03 3.63E+03 3.63E+03 3.50E+03 3.50E+03	170 Cps 6.59E+01 5.64E+01 7.47E+01 5.38E+01 4.30E+01 3.385E+01 6.18E+01 2.32E+01 1.37E+01 2.36E+01 1.37E+01 2.36E+01 3.26E+01 1.51E+01 1.52E+01 1.45E+01 1.45E+01 1.45E+01 1.15E+01 1.15E+01 1.15E+01 1.15E+01 1.15E+01 1.15E+01	180 Tot. 1.91E+04 1.31E+04 3.14E+03 9.45E+03 9.45E+03 9.45E+03 9.45E+03 9.45E+03 2.20E+04 1.20E+04 1.20E+04 1.20E+04 3.16E+04 3.16E+04 3.16E+04 3.16E+04 1.31E+04 1.52E+	180 Cps 3.36E+02 2.89E+02 3.70E+02 2.16E+02 1.94E+02 3.09E+02 3.09E+02 1.19E+02 3.09E+02 1.19E+02 6.87E+01 1.22E+02 1.10E+02 4.68E+01 3.07E+01 5.68E+01 5.68E+01 5.98E+01 5.98E+01 5.98E+01	0.1 Delta 18 % 27.4 85.1 34.1 41.7 85.4 43.9 51.1 89.4 64.1 79.2 57.3 91.2 37.2 51.2 31.7 127.9 105.3 84.6 67.7 105.8 84.9 149.1 156.4 124.1 156.4 124.1 156.4 124.1 156.4 124.1 156.4 124.1 156.4 124.1 156.4 124.1 156.4 124.1 156.4 124.1 156.4 124.1 156.4 124.1 156.4 124.1 156.4 124.1 156.4 124.1 156.4 124.1 156.2 124.1 156.2 124.1 156.2 157.2 15	5.0 ± 18 (2s) % 7.2 8.7 17.9 10.3 11.4 10.2 12.7 6.7 9.1 4.7 6.8 5.1 5.6 5.3 4.4 8.2 6.3 6.0 6.5 7.5 9.9 7.5 7.3 6.6 -	Delta 17 % 155.6 214.2 195.8 168.1 239.0 205.0 195.3 174.2 190.1 186.7 188.9 190.1 186.7 188.9 213.5 129.5 131.6 157.4 197.6 205.5 184.2 194.3 286.6 216.1 263.5 199.9 232.5	<ul> <li>a.1</li> <li>a.1</li> <li>a.1</li> <li>a.1</li> <li>a.1</li> <li>b.3</li> <li>b.6</li> <li>c.3</li> <li>c.4</li> <li>c.3</li> <li>c.4</li> <li>c.4</li> <li>c.7</li> <li>c.4</li> <li>c.7</li> <li>c.4</li> <li>c.7</li> <li>c.4</li> <li>c.6</li> <li>c.1</li> <li>c.9</li> <li>c.1</li> <li>c.4</li> <li>c.6</li> <li>c.1</li> <li>c.9</li> <li>c.1</li> <li>c.1</li> <li>c.9</li> <li>c.1</li> <li>c.1</li> <li>c.1</li> <li>c.2</li> <li>c.9</li> <li>c.1</li> <li>c.4</li> <li>c.6</li> <li>c.6</li> <li>c.7</li> <li>c.6</li> <li>c.7</li> <li>c.7</li> <li>c.6</li> <li>c.6</li> <li>c.7</li> <li>c.7</li> <li>c.6</li> <li>c.7</li> <li>c.7</li></ul>
FR35 FR35 Hot Spot 3 Hot Spot 8 Hot Spot 10 Hot Spot 10 Hot Spot 11 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 21 Hot Spot 21 Hot Spot 21 Randomm Area 10 Randomm Area 11 Randomm Area 13 Randomm Area 13 Randomm Area 14 Randomm Area 15 Randomm Area 16 Randomm Area 17 Randomm Area 18 Randomm Area 21 Randomm Area 21 Randomm Area 24 Randomm Area 24 Randomm Area 24 Randomm Area 24 Randomm Area 24	Sample Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer On Si Wafer Si Wafer On Si Wafer Si W	160 Tot. 8.71E+06 5.75E+06 1.42E+06 4.26E+06 3.35E+06 2.18E+06 5.28E+06 5.28E+06 5.28E+06 5.28E+06 1.94E+07 9.50E+06 1.65E+07 1.43E+07 6.13E+06 1.04E+07 2.38E+07 6.13E+06 1.04E+07 2.38E+07 6.13E+06 1.04E+07 2.38E+07 6.13E+06 7.25E+06 7.25E+06 7.26E+07 7.26E+07 7.2	160 Cps 1.54E+05 1.25E+05 1.24E+05 1.24E+05 9.33E+04 8.59E+04 1.39E+05 5.33E+04 3.18E+04 3.18E+04 3.18E+04 3.05E+04 3.05E+04 3.05E+04 2.32E+04 2.32E+04 2.31	170 Tot. 3.74E+03 2.59E+03 6.33E+02 1.54E+03 9.78E+02 9.78E+02 9.78E+02 1.22E+03 4.20E+03 2.33E+03 8.59E+03 4.13E+03 6.79E+03 1.03E+04 2.73E+03 3.64E+03 3.53E+03 3.53E+03 3.54E+03 3.55E+04 5.55E+050E+05 5.55E+0500000000000000000000000000000000	170 Cps 6.59E+01 5.64E+01 7.47E+01 3.85E+01 3.85E+01 3.38E+01 2.32E+01 1.37E+01 2.32E+01 1.37E+01 2.73E+01 1.37E+01 2.73E+01 1.31E+01 2.16E+01 3.26E+01 8.67E+00 1.32E+01 1.15E+01 6.03E+00 1.35E+01 1.15E+01 6.03E+00 1.36E+01 1.16	180 Tot. 1.91E+04 1.31E+04 3.14E+03 9.45E+03 9.45E+03 9.54E+03 9.54E+03 9.54E+03 9.54E+04 1.20E+04 4.47E+04 2.20E+04 1.20E+04 1.36E+04 2.24E+04 1.37E+04 2.80E+04 1.37E+04 1.92E+	180 Cps 3.36E+02 2.89E+02 3.70E+02 2.75E+02 2.75E+02 2.75E+02 2.75E+02 1.19E+02 7.38E+01 7.38E+01 1.42E+02 6.687E+01 7.38E+01 7.38E+01 7.35E+01 7.45E+01 7.45E+01 7.35E+01 3.27E+01 5.69E+01 5.56E+01 3.32F+01 5.56E+01 5.5	0.1 Delta 18 % 27.4 85.1 34.1 41.7 85.4 58.4 58.4 58.4 59.4 64.1 79.2 37.2 37.2 31.7 127.9 105.3 84.6 67.7 105.8 149.1 156.4 124.5 121.1 70.9 10.9	3.0 ± 18 (2s) % 7.2 8.7 17.9 10.3 11.4 14.3 10.2 12.7 9.1 4.7 9.1 4.7 9.1 4.7 9.1 4.7 9.1 4.5 6.8 5.3 4.4 8.2 6.3 6.0 6.5 7.5 9.9 9.7 7.5 7.3 6.6 7.7 7.5 7.3 6.6 7.7 7.5 7.5 7.3 7.5 7.5 7.5 7.5 7.5 7.5 7.5 7.5	Delta 17 % 155.6 214.2 195.8 168.1 239.0 205.9 195.3 174.2 190.1 186.7 188.7 213.5 129.5 131.6 157.4 197.4 197.4 197.4 197.4 205.5 184.2 205.5 184.3 286.6 216.1 263.5 199.9 232.5 234.0 232.5 234.0 24.1 235.5 234.0 24.2 235.5 235.4 235.5 235.4 235.5 235.4 235.5 235.4 235.5 235.4 235.5 235.4 235.5 235.4 235.5 255.5 255.5 255.5 255.5 255.5 255.5 255.5 255.5 255.5 255	a.1 ±17(2s) %a 16.3 19.6 39.7 23.3 25.4 32.0 22.9 28.7 10.8 15.6 11.6 12.1 9.9 12.1 9.9 12.1 14.4 13.7 14.8 16.6 22.9 17.1 16.9 17.1 17.9 17.1 17.9 17.1 17.9 17.1 17.9 17.1 17.9 17.1 17.9 17.1 17.9 17.1 17.9 17.1 17.9 17.1 17.9 17.1 17.9 17.1 17.9 17.1 17.1 17.9 17.1 17.1 17.1 17.1 17.1 17.1 17.1 17.1 17.1 17.1 17.1 17.1 17.1 17.1 17.1 17.1 17.1 17.2 1
FR35 Hot Spot 3 Hot Spot 10 Hot Spot 10 Hot Spot 10 Hot Spot 10 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 22 Randomm Area 10 Randomm Area 11 Randomm Area 13 Randomm Area 13 Randomm Area 14 Randomm Area 15 Randomm Area 15 Randomm Area 17 Randomm Area 18 Randomm Area 19 Randomm Area 22 Randomm Area 22 Randomm Area 24 Randomm Area 24 Randomm Area 25 Hot Spot 4 Hot Spot 4	Sample Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer On Si Wafer Si W	160 Tot. 8.71E+06 5.75E+06 1.42E+06 3.35E+06 2.18E+06 9.50E+06 9.50E+06 9.50E+06 9.50E+06 1.94E+07 9.60E+06 1.94E+07 1.61E+07 1.61E+07 1.61E+07 1.238E+07 1.238E+07 1.238E+07 6.132E+07 1.238E+07 7.59E+06 7.59E+07 7.59E+06 7.59E+07 7.59E+06 7.59E+07 7.59E+06 7.59E+0	160 Cps 1.54E+05 1.25E+05 1.25E+05 1.24E+05 9.33E+04 8.59E+04 1.39E+05 5.33E+04 3.18E+04 3.18E+04 3.18E+04 3.18E+04 3.318E+04 4.54E+04 5.24E+04 1.52E+05 3.38E+04 1.340E+04 3.38E+04 1.34E+04 2.31E+04 2.31E+04 2.31E+04 2.31E+04 2.31E+04 2.31E+04 2.31E+04 2.31E+04 2.31E+04 2.31E+04 2.31E+05 2.32E+05 2.	170 Tot. 3.74E+03 2.59E+03 6.33E+02 1.54E+03 9.78E+02 1.91E+03 1.22E+03 4.20E+03 4.23E+03 4.23E+03 4.23E+03 4.36E+03 5.34E+03 5.34E+03 3.63E+03 3.63E+03 3.54E+03 3.5	170 Cps 6.59E+01 5.64E+01 7.47E+01 5.38E+01 4.30E+01 5.38E+01 4.30E+01 3.38E+01 1.41E+01 1.37E+01 2.32E+01 1.31E+01 2.36E+01 1.91E+01 8.67E+00 1.45E+01 1.15	180 Tot. 1.91E+04 1.31E+04 3.14E+03 9.45E+03 9.54E+03 9.54E+03 9.54E+03 9.54E+03 9.54E+03 1.20E+04 1.20E+04 1.20E+04 1.20E+04 1.20E+04 1.36E+04 3.61E+04 3.61E+04 2.32E+04 1.39E+04 1.59E+	180 Cps 3.36E+02 2.89E+02 3.70E+02 2.73E+02 2.73E+02 2.73E+02 1.94E+02 1.94E+02 7.38E+01 7.03E+01 1.42E+02 6.87E+01 1.42E+02 6.87E+01 1.52E+02 1.66E+02 1.66E+02 1.66E+02 1.66E+01 8.01E+01 8.01E+01 3.27E+01 5.68E+01 5.86E+0100000000000000000000000000000000	0.1 Delta 18 % 27.4 85.1 34.1 41.7 85.4 43.9 31.1 89.4 64.1 79.2 57.3 37.2 51.2 5.2 5.2 5.2 5.2 5.2 5.2 5.2 5	3.0 ± 18 (2s) % 7.2 8.7 17.9 10.3 11.4 14.3 10.2 12.7 6.7 9.1 4.7 6.8 5.1 5.6 5.3 4.4 8.2 6.3 6.0 6.5 7.5 9.9 7.5 7.3 6.6 7.7 9.3 11.6	Delta 17 % 155.6 214.2 194.2 195.3 174.2 190.1 186.7 174.2 190.1 186.9 174.2 190.1 186.9 174.2 190.1 186.9 174.2 190.5 131.6 157.4 197.5 131.6 205.5 131.6 205.5 134.2 205.5 134.2 205.5 134.6 216.1 266.6 216.1 266.6 216.1 265.5 254.0 81.1 110.4	a.1 <b>±17 (2s)</b> % 16.3 19.6 39.7 23.3 25.4 20.7 15.4 20.7 10.8 15.6 11.6 11.6 12.9 19.1 14.1 13.7 14.8 16.6 22.9 19.1 14.1 15.9 19.1 19.1 19.5 10.8 10.6 11.6 11.6 11.6 12.9 19.1 19.1 19.5 10.8 10.6 10.8 10.7 10.8 10.6 10.9 10.1 10.8 10.6 10.7 10.8 10.7 10.8 10.7 10.8 10.7 10.8 10.7 10.8 10.7 10.8 10.7 10.8 10.7 10.8 10.7 10.8 10.7 10.8 10.7 10.8 10.6 10.7 10.8 10.7 10.8 10.7 10.8 10.6 10.7 10.8 10.8 10.
FR35 FR35 Hot Spot 3 Hot Spot 10 Hot Spot 10 Hot Spot 10 Hot Spot 13 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 22 Randomm Area 10 Randomm Area 11 Randomm Area 13 Randomm Area 13 Randomm Area 15 Randomm Area 18 Randomm Area 18 Randomm Area 20 Randomm Area 20 Randomm Area 21 Randomm Area 22 Randomm Area 23 Randomm Area 25 Hot Spot 12 Hot Spo	Sample Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer On Si Wafer Si W	160 Tot. 8.71E+06 5.75E+06 1.42E+06 4.26E+06 4.26E+06 4.26E+06 4.20E+06 2.18E+06 2.218E+06 2.218E+06 9.50E+06 5.28E+06 1.05E+07 1.43E+07 1.43E+07 1.31E+07 1.31E+07 1.31E+07 1.31E+07 7.39E+06 4.20E+06 4.20E+06 5.26E+06 5.32E+06 5	160 Cps 1.54E+05 1.25E+05 1.25E+05 1.25E+05 1.24E+05 9.33E+04 1.34E+05 9.33E+04 1.34E+04 3.318E+04 3.318E+04 3.318E+04 3.34E+04 4.54E+04 4.54E+04 1.34E+04 3.345E+04 3.345E+04 3.345E+04 3.345E+04 3.345E+04 3.345E+05 1.15E+05 9.00E+05	170 Tot. 3.74E+03 2.59E+03 6.33E+02 1.54E+03 9.78E+02 1.91E+03 1.22E+03 2.33E+03 8.59E+03 4.13E+03 6.09E+03 1.03E+04 2.33E+03 4.85E+03 3.41E+03 3.41E+03 3.41E+03 3.42E+03 2.42E+03 4.43E+03 2.42E+03 4.43E+03 2.42E+03 4.43E+03 2.42E+03 4.43E+03E+03	170 Cps 6.59E+01 5.64E+01 7.47E+01 5.38E+01 4.30E+01 3.38E+01 4.30E+01 2.32E+01 1.31E+01 2.32E+01 1.31E+01 2.36E+01 1.31E+01 2.36E+01 1.52E+01 1.55E+01 1.11E+01 1.12	180 Tot. 1.91E+04 1.31E+03 3.14E+03 9.45E+03 9.54E+03 9.54E+03 9.54E+03 9.54E+03 9.54E+04 1.20E+04 1.20E+04 1.20E+04 1.31E+04 1.52E+04 1.34E+04 1.34E+04 1.35E+	180 Cps 3.36E+02 2.89E+02 3.70E+02 2.75E+02 2.75E+02 2.75E+02 2.75E+02 2.309E+02 1.194E+02 7.38E+01 1.42E+02 6.87E+01 1.42E+02 4.66E+02 4.66E+02 1.56E+02 3.66E+01 3.27E+01 3.56E+01 3.27E+01 3.54E+01 2.84E+02 2.46E+02 2.46E+02 1.95E+02	0.1 Delta 18 % 27.4 85.1 34.1 34.1 34.1 34.1 34.1 35.2 35.2 35.2 35.2 35.2 37.2 37.2 37.2 37.2 37.2 37.2 37.2 37.2 37.2 37.2 37.2 37.2 37.2 37.2 37.2 31.7 127.9 105.8 149.1 156.4 149.4 158.4 105.8 149.1 156.8 124.5 121.1 156.8 149.1 156.8 149.1 156.8 149.1 156.8 149.1 156.8 149.1 156.8 124.5 121.1 156.8 149.1 156.8 124.5 121.1 156.8 149.1 156.8 124.5 121.1 156.8 124.5 121.1 156.8 124.5 121.1 156.8 124.5 121.1 156.8 124.5 121.1 156.8 124.5 121.1 156.8 124.5 121.1 156.8 124.5 121.1 156.8 124.5 121.1 156.8 124.5 121.1 156.8 124.5 121.1 156.8 124.5 121.1 156.8 124.5 121.1 156.8 124.5 121.1 156.8 124.5 121.1 156.8 124.5 121.1 124.5 121.1 124.5 121.1 124.5	5.0 ★ 18 (2s) % 7.2 8.7 17.9 10.3 11.4 14.3 10.2 12.7 6.7 9.1 4.7 6.8 5.1 5.6 5.3 4.4 8.2 6.3 6.0 6.5 9.9 7.5 7.3 6.6 7.7 9.3 11.4 9.1 14.4 14.4 15.6 15.6 15.6 15.7 9.7 15.7 15.6 15.7 15	110.5           Delta 17           %           155.6           214.2           195.8           168.1           230.9           195.3           174.2           190.1           186.7           188.9           157.9           213.5           131.6           157.4           197.6           205.5           184.2           197.6           216.1           266.6           216.1           263.5           254.0           216.1           263.5           199.9           232.5           254.0           254.1           110.4           91.2	a.1 <b>±17 (2s)</b> <b>%</b> 16.3 19.6 39.7 23.3 25.4 20.7 28.9 28.7 15.4 20.7 15.6 11.6 22.9 15.1 14.8 16.6 22.9 17.1 14.8 16.6 22.9 17.1 16.9 17.0 16.9 17.0 16.9 17.0 16.9 17.0 16.9 17.0 16.9 17.0 16.9 17.0 20.7 15.0 17.0 20.7 15.4 20.9 15.1 10.7 10.8 10.7 10.8 10.7 10.6 20.9 10.1 14.8 16.6 22.9 17.0 17.0 20.0 20.7 2
FR35 FR35 Hot Spot 3 Hot Spot 10 Hot Spot 10 Hot Spot 11 Hot Spot 13 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 22 Randomm Area 10 Randomm Area 13 Randomm Area 13 Randomm Area 13 Randomm Area 16 Randomm Area 16 Randomm Area 18 Randomm Area 23 Randomm Area 21 Randomm Area 21 Randomm Area 23 Randomm Area 23 Randomm Area 24 Randomm Area 24 Randomm Area 24 Hot Spot 9 Hot Spot 12 Hot Spot 14 Hot Spot 14 Hot Spot 12 Hot Spot 14 Hot Spot 14	Sample Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer On Si Wafer Hot Spot on Si Wafer Hot Spot on Si Wafer Hot Spot on Si Wafer Hot Spot on Si Wafer	160 Tot. 8.71E+06 5.75E+06 1.42E+06 3.35E+06 4.29E+06 4.29E+06 4.29E+06 5.28E+06 1.56E+07 1.43E+07 1.61E+07 2.38E+07 1.43E+07 1.43E+07 1.61E+07 2.38E+07 1.34E+07 1.34E+07 1.34E+06 4.20E+06 4.20E+06 4.20E+06 5.52E+06 3.51E+06 3.51E+06 2.08E+06 2.08E+06 3.57E+06	160 Cps 1.54E+05 1.25E+05 1.25E+05 1.68E+05 9.33E+04 1.34E+05 5.33E+04 3.318E+04 3.318E+04 3.318E+04 3.318E+04 4.54E+04 1.35E+04 3.365E+04 3.365E+04 3.365E+04 3.367E+	170 Tot. 3.74E+03 2.59E+03 6.33E+02 1.54E+03 9.78E+02 1.91E+03 1.24E+03 9.78E+02 1.91E+03 1.24E+03 2.33E+03 6.00E+03 1.34E+03 6.00E+03 3.45E+03 4.36E+03 3.46E+03 3.44E+02 2.22E+03 1.45E+	170 Cps 6.59E+01 5.64E+01 7.47E+01 5.38E+01 4.30E+01 3.385E+01 1.31E+01 2.32E+01 1.31E+01 2.32E+01 1.31E+01 2.32E+01 1.31E+01 2.32E+01 1.31E+01 2.32E+01 1.32E+01 1.55E+01 1.11E+01 1.11E+01 1.11E+01 1.11E+01 1.11E+01 1.11E+01 1.11E+01 1.11E+01 1.11E+01 1.35E+01 1.35E+01 1.35E+01 2.36E+01 3.35E+01 3.3	180 Tot. 1.91E+04 1.31E+04 3.14E+03 9.45E+03 9.45E+03 9.45E+03 9.45E+03 9.45E+03 2.20E+04 1.20E+04 1.20E+04 1.20E+04 3.16E+04 3.16E+04 3.16E+04 3.16E+04 2.32E+04 1.47E+04 1.28E+04 1.79E+04 1.79E+04 1.79E+04 1.58E+04 3.15E+04 3.15E+04 3.71E+03 7.74E+03 7.75E+04 7.75E+	180 Cps 3.36E+02 2.89E+02 3.70E+02 2.16E+02 1.94E+02 3.09E+02 3.09E+02 1.19E+02 3.09E+02 1.19E+02 6.87E+01 1.42E+02 6.87E+01 1.42E+02 6.87E+01 1.42E+02 6.87E+01 7.35E+01 5.68E+01 2.56E+01 7.33E+01 7.35E+01 7.35E+01 7.35E+01 7.35E+01 7.35E+01 7.35E+01 7.35	0.1 Delta 18 % 27.4 85.1 34.1 41.7 85.4 43.9 51.1 89.4 64.1 77.9 105.3 84.6 67.7 105.8 84.6 67.7 105.3 84.6 67.7 105.3 84.6 67.7 127.9 105.3 84.6 67.7 127.9 105.3 84.6 67.7 127.9 105.3 84.6 67.7 127.9 105.3 84.6 67.7 127.9 105.3 84.6 67.7 127.9 105.3 84.6 67.7 125.9 105.4 126.5 121.1 156.5 121.1 156.5 121.1 156.5 121.1 125.5	5.0 ± 18 (2s) % 7.2 8.7 17.9 10.3 11.4 10.2 12.7 6.7 9.1 4.7 6.7 9.1 4.7 6.8 5.1 5.6 5.3 4.4 8.2 6.3 4.4 8.2 6.3 9.9 7.5 9.9 7.5 9.9 7.5 9.9 7.5 9.9 7.5 9.9 7.5 9.9 7.5 9.9 7.5 9.9 7.5 9.9 7.5 9.9 7.5 9.9 7.5 9.9 7.5 9.9 7.5 9.1 4.4 8.2 6.0 6.5 7.5 9.1 4.4 8.2 6.0 6.5 7.5 9.1 4.4 8.2 6.0 6.5 7.5 9.1 4.4 8.2 6.0 6.5 7.5 9.1 4.4 8.2 6.0 6.5 7.5 9.1 1.4 8.2 6.0 6.5 7.5 9.1 1.4 8.2 6.0 6.5 7.5 9.1 1.4 4.4 8.2 6.0 6.5 7.5 9.1 1.4 4.4 8.2 6.0 6.5 7.5 9.1 1.4 1.4 1.4 1.5 6.5 7.5 1.5 6.5 7.5 1.5 6.5 7.5 1.5 6.5 7.5 1.5 6.5 7.5 1.5 6.5 7.5 1.5 6.5 7.5 1.5 6.6 7.5 9.9 7.5 1.1 6.6 7.5 9.9 7.5 1.1 6.6 7.5 9.9 1.1 6.6 7.5 9.1 1.4 9.1 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1	110.5           Delta 17           %           155.6           214.2           195.8           168.1           239.0           205.9           195.3           174.2           190.1           186.7           188.9           213.5           131.6           157.9           131.6           157.4           197.6           205.5           184.2           194.3           286.6           216.1           263.5           199.9           232.5           254.0           254.1           110.4           91.2           60.2	<ul> <li>a.1</li> <li>a.1</li> <li>a.1</li> <li>a.1</li> <li>b.2</li> <li>b.3</li> <li>b.6</li> <li>c.3</li> <li>c.4</li> <li>c.2</li> <li>c.4</li> <li>c.7</li> <li>c.4</li> <li>c.7</li> <li>c.4</li> <li>c.7</li> <li>c.6</li> <li>c.1.6</li> <lic.1.6< li=""> <li>c.1.6</li> <li>c.1.6</li> <li>c</li></lic.1.6<></ul>
FR35 FR35 Hot Spot 3 Hot Spot 10 Hot Spot 10 Hot Spot 10 Hot Spot 11 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 22 Randomm Area 10 Randomm Area 13 Randomm Area 13 Randomm Area 13 Randomm Area 14 Randomm Area 15 Randomm Area 15 Randomm Area 16 Randomm Area 18 Randomm Area 19 Randomm Area 20 Randomm Area 21 Randomm Area 21 Randomm Area 23 Randomm Area 24 Randomm Area 24 Hot Spot 12 Hot Spot 12 Hot Spot 12 Hot Spot 14 Hot Spot 14 Hot Spot 14 Hot Spot 14 Hot Spot 14 Hot Spot 15 Hot Spot 14 Hot Spot 15 Hot Spot 14 Hot Spot 15 Hot Spot 14 Hot Spot 15 Hot Spot	Sample Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer On Si Wafer Si Wafer Si Wafer Si Wafer Si Wafer Si Wafer Si Wafer Hot Spot on Si Wafer	160 Tot. 8.71E+06 5.75E+06 1.42E+06 4.26E+06 4.26E+06 4.29E+06 4.29E+06 4.29E+06 4.29E+06 5.28E+06 1.95E+07 1.61E+07 2.38E+07 6.13E+06 1.07E+07 1.32E+07 6.13E+06 7.29E+06 7.2	160 Cps 1.54E+05 1.25E+05 1.24E+05 9.33E+04 1.34E+05 9.33E+04 3.05E+04 3.05E+04 3.05E+04 3.05E+04 3.05E+04 3.05E+04 3.05E+04 3.28E+04 3.28E+04 3.28E+04 3.28E+04 3.28E+04 3.28E+04 3.28E+04 3.28E+04 3.28E+04 1.35E+05 1.15E+04 1.35E+05 1.15	170 Tot. 3.74E+03 2.59E+03 6.33E+02 1.54E+03 9.78E+02 1.91E+03 1.54E+03 2.32E+03 4.20E+03 2.33E+03 8.59E+03 3.43E+03 6.00E+03 3.43E+03 3.43E+03 3.41E+03 3.41E+03 3.44E+	170 Cps 6.59E+01 5.64E+01 7.47E+01 5.38E+01 4.30E+01 3.38E+01 6.18E+01 2.32E+01 1.37E+01 2.32E+01 1.37E+01 2.36E+01 1.37E+01 2.36E+01 2.36E+01 2.36E+01 1.51E+01 6.03E+00 1.86TE+01 1.41E+01 1.15E+01 6.03E+00 1.86TE+01 1.35E+01 4.45E+01 4.76E+01 4.	180 Tot. 1.91E+04 1.31E+04 3.14E+03 9.45E+03 9.45E+03 9.45E+03 9.45E+03 9.45E+03 9.45E+03 2.20E+04 1.47E+04 1.20E+04 1.31E+04 3.16E+04 3.16E+04 3.16E+04 1.31E+04 1.31E+04 1.31E+04 1.32E+	180 Cps 3.36E+02 2.89E+02 3.70E+02 2.75E+02 2.16E+02 1.94E+02 3.09E+02 3.09E+02 3.09E+02 3.09E+02 1.19E+02 7.38E+01 1.22E+02 1.15E+02 1.66E+02 4.66E+01 7.45E+01 5.68E+01 7.45E+01 5.98E+01 7.45E+01 5.98E+01 7.33E+01 5.98E+01 7.33E+01 5.98E+01 7.33E+01 2.88E+02 2.88E+02 2.88E+02 2.88E+02 2.88E+02 2.88E+02 2.88E+02 2.88E+02 2.88E+02 2.88E+02 2.88E+02 2.34E+02 3.00E+02 2.34E+02 3.00E+02 3.00E+02 2.34E+02 3.00E+02 3.00E+02 3.00E+02 2.48E+02 3.00	0.1           Delta 18           %           27.4           85.1           34.1           41.7           85.4           39.5           51.1           89.4           64.1           79.2           51.2           31.7           127.9           105.3           84.6           67.7           105.4           124.1           70.9           19.8           0.5           19.4           -5.9           -5.6           77.7	3.0 ± 18 (2s) % 7.2 8.7 17.9 10.3 11.4 10.2 12.7 9.1 4.7 6.8 5.1 1.6 5.6 5.3 4.4 8.2 6.3 6.0 6.5 7.5 7.3 6.6 7.7 9.9 7.5 7.3 6.6 7.7 9.3 11.6 11.8 12.4 12.7 12.7 12.7 10.3 11.4 12.7 12.7 10.3 11.4 14.3 10.2 12.7 12.7 10.3 11.4 14.3 10.2 12.7 15.6 15.6 15.6 15.6 15.6 15.6 15.6 15.6 15.6 15.6 15.6 16.7 17.9 16.7 17.9 16.7 17.9 17.9 17.9 18.7 18.7 19.1 19.1 18.7 19.1	110.5           Delta 17           %           155.6           214.2           195.8           168.1           239.0           205.3           174.2           190.1           190.1           186.7           188.7           186.7           186.7           186.7           186.7           197.6           205.5           131.6           157.9           213.5           184.2           194.3           286.6           216.1           263.5           254.0           31.1           110.4           91.2           60.2           69.8           67.6	<ul> <li>a.1</li> <li>a.1</li> <li>a.1</li> <li>a.1</li> <li>a.1</li> <li>a.2</li> <li>b.3</li> <li>a.2</li> <li>b.4</li> <li>a.2</li> <li>a.4</li> <li>a.4</li></ul>
FR35 FR35 Hot Spot 3 Hot Spot 10 Hot Spot 10 Hot Spot 10 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 22 Randomm Area 10 Randomm Area 11 Randomm Area 12 Randomm Area 13 Randomm Area 13 Randomm Area 15 Randomm Area 15 Randomm Area 15 Randomm Area 17 Randomm Area 18 Randomm Area 22 Randomm Area 22 Randomm Area 22 Randomm Area 24 Randomm Area 24 Randomm Area 24 Randomm Area 25 Hot Spot 4 Hot Spot 12 Hot Spot 12 Hot Spot 12 Hot Spot 12 Hot Spot 14 Hot Spot 19 Hot Spot 19 Hot Spot 19 Hot Spot 19 Hot Spot 18	Sample Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer On Si Wafer Hot Spot on Si Wafer	160 Tot. 8.71E+06 5.75E+06 1.42E+06 3.35E+06 2.18E+06 9.50E+06 9.50E+06 9.50E+06 9.50E+06 9.50E+06 1.94E+07 9.60E+07 1.34E+07 1.3	160 Cps 1.54E+05 1.25E+05 1.25E+05 1.24E+05 9.33E+04 8.59E+04 1.39E+05 5.33E+04 3.18E+04 3.18E+04 3.18E+04 3.18E+04 3.318E+04 3.318E+04 3.318E+04 3.318E+04 1.34E+04 1.34E+04 2.34E+04 1.34E+04 2.35E+04 3.36E+04 1.34E+05 1.35E+05 3.36E+05 1.15E+05 9.00E+05 1.15E+05 9.00E+05 1.15E+05 9.36E+05 1.15E+05 1.35E+05	170 Tot. 3.74E+03 2.59E+03 6.33E+02 1.54E+03 9.78E+02 1.54E+03 9.78E+02 1.54E+03 4.22E+03 4.22E+03 4.23E+03 4.23E+03 6.079E+03 1.03E+04 2.33E+03 5.34E+03 3.53E+03 3.54E+03 3.55E+03 3.54E+03 3.54E+03 3.54E+03 3.54E+03 3.54E+03 3.54E+03 3.54E+03 3.54E+03 3.54E+03 3.54E+03 3.54E+03 3.54E+03 3.54E+03 3.54E+03 3.54E+03 3.55E	170 Cps 6.59E+01 5.64E+01 7.47E+01 5.38E+01 4.30E+01 5.38E+01 4.30E+01 5.38E+01 1.41E+01 1.37E+01 2.32E+01 1.31E+01 2.36E+01 1.91E+01 2.36E+01 1.45E+01 1.15E+01 1.15E+01 1.15E+01 1.15E+01 1.15E+01 1.15E+01 1.15E+01 1.30E+01 5.54E+01 4.76E+01 3.56E+01 3.56E+01 3.56E+01 5.54E+01 5.54E+01 5.54E+01 5.54E+01 5.54E+01 5.54E+01 5.54E+01 5.54E+01 5.54E+01 5.54E+01 5.54E+01 5.54E+01 5.54E+01 5.55E+01 3.56E+01 5.55	180 Tot. 1.91E+04 1.33E+04 3.14E+03 9.45E+03 9.45E+03 9.54E+03 9.54E+03 6.25E+03 2.02E+04 1.20E+04 1.20E+04 2.38E+04 2.36E+04 3.61E+04 3.61E+04 3.61E+04 2.32E+04 1.39E+04 1.49E+04 1.59E+	180 Cps 3.36E+02 2.89E+02 3.70E+02 2.75E+02 2.75E+02 2.75E+02 2.76E+02 1.94E+02 1.94E+02 7.38E+01 7.03E+01 1.42E+02 6.87E+01 1.22E+02 1.66E+02 1.66E+02 1.66E+02 1.66E+02 1.66E+02 1.66E+01 3.27E+01 5.68E+01 5.89E+01 5.89E+01 5.89E+01 5.89E+01 5.85E+02 2.24E+02 2.34E+02 2.24E+02 2.34E+02 3.00E+02 1.73E+00	0.1 Detta 18 % 27.4 85.1 34.1 41.7 85.4 43.9 51.1 89.4 64.1 79.2 57.3 91.2 37.2 51.2 31.7 127.9 105.3 84.6 67.7 105.8 149.4 156.4 1	3.0 ± 18 (2s) % 7.2 8.7 17.9 10.3 11.4 14.3 10.2 12.7 6.7 9.1 4.7 6.8 5.1 5.6 5.3 4.4 8.2 6.3 6.0 6.5 7.5 9.9 7.5 7.3 6.6 7.7 9.3 6.6 7.5 9.7 9.7 9.7 9.7 9.1 4.7 6.8 1.5 6.3 6.3 6.5 7.5 9.7 9.1 1.6 14.9 11.6 14.9 11.6 14.9 11.6 14.9 11.6 14.9 11.6 14.9 11.6 14.9 11.6 14.9 11.6 14.9 11.6 14.9 11.6 14.9 11.6 14.9 11.6 14.9 11.6 14.9 11.6 14.9 11.6 14.9 11.6 14.9 11.6 14.9 11.6 10.2 11.6 14.7 15.6 15.7 17.7 1	Delta 17 % 155.6 214.2 194.2 195.3 174.2 190.1 186.7 174.2 190.1 186.9 174.2 190.1 186.9 174.2 190.1 186.9 174.2 190.1 186.9 174.2 190.5 131.6 157.4 197.5 213.5 131.6 215.5 131.6 215.5 131.6 215.5 131.6 215.5 2	<ul> <li>a.1</li> <li>a.1</li> <li>a.1</li> <li>a.1</li> <li>a.3</li> <li>a.9</li> <li>a.9</li> <li>a.3</li> <li>a.5</li> <li>a.4</li> <li>a.7</li> <li>a.6</li> <li>a.6</li> <li>a.6</li> <li>a.6</li> <li>a.7</li> <li>a.6</li> <li>a.9</li> <li>a.1</li> <li>a.6</li> <li>a.9</li> <li>a.1</li> <li>a.6</li> <li>a.9</li> <li>a.1</li> <li>a.6</li> <li>a.6</li></ul>
FR35 FR35 Hot Spot 3 Hot Spot 10 Hot Spot 10 Hot Spot 10 Hot Spot 13 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 22 Randomm Area 10 Randomm Area 11 Randomm Area 13 Randomm Area 13 Randomm Area 13 Randomm Area 15 Randomm Area 16 Randomm Area 17 Randomm Area 18 Randomm Area 20 Randomm Area 20 Randomm Area 21 Randomm Area 22 Randomm Area 23 Randomm Area 25 Hot Spot 12 Hot Spot 12 Hot Spot 12 Hot Spot 12 Hot Spot 14 Hot Spot 18 Randomn Area 1	Sample Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer On Si Wafer Hot Spot on Si Wafer	160 Tot. 8.71E+06 5.75E+06 1.42E+06 4.26E+06 4.26E+06 4.26E+06 4.26E+06 4.20E+06 2.18E+06 2.218E+06 2.218E+06 2.28E+06 1.05E+07 1.31E+07 1.31E+07 1.31E+07 1.31E+07 1.31E+07 1.31E+07 1.31E+07 1.31E+07 7.39E+06 4.20E+06 4.20E+06 3.31E+06 5.52E+06 3.31E+06 5.52E+06 3.31E+06 5.52E+06 3.31E+07 3.31E+07 3.32E+06 3.31E+06 3.32E+06 3	160 Cps 1.54E+05 1.25E+05 1.25E+05 1.25E+05 1.35E+04 1.34E+05 9.33E+04 1.34E+05 9.33E+04 3.318E+04 3.318E+04 3.318E+04 3.318E+04 3.345E+04 3.345E+04 3.345E+04 3.345E+04 3.345E+04 1.345E+05 1.35E+05 9.00E+04 1.345E+05 1.15E+05 9.00E+04 1.345E+05 1.15E+05 9.00E+04 1.345E+05 1.15E+05 1.35E+04 1.35E+05 1.35E+05 1.35E+04 1.35E+05	170 Tot. 3.74E+03 2.59E+03 6.33E+02 1.54E+03 9.78E+02 1.54E+03 9.78E+02 1.54E+03 2.33E+03 8.59E+03 1.32E+03 4.32E+03 4.32E+03 4.32E+03 4.36E+03 3.41E+03 3.41E+03 3.42E+03 4.36E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 1.45E+03 8.44E+02 1.33E+03 1.44E+03 1.44E+	170 Cps 6.59E+01 5.64E+01 7.47E+01 5.38E+01 4.30E+01 3.38E+01 2.32E+01 1.31E+01 2.32E+01 1.31E+01 2.32E+01 1.31E+01 2.36E+01 3.26E+01 8.67E+00 1.53E+01 1.31E+01 1.5E+01 1.31E+01 1.31E+01 1.35E+01 1.31E+01 1.35E+01 1.31E+01 3.65E+01 3.65E+01 3.65E+01 5.45E+01 3.65E+01 5.45E	180 Tot. 1.91E+04 1.31E+03 3.14E+03 9.45E+03 9.54E+03 9.54E+03 9.54E+03 9.54E+03 9.54E+03 9.54E+04 1.20E+04 3.316E+04 3.316E+04 3.316E+04 3.316E+04 1.31E+04 1.32E+04 1.	180 Cps 3.36E+02 2.89E+02 3.70E+02 2.75E+02 2.75E+02 2.75E+02 2.75E+02 2.75E+02 2.75E+02 2.75E+02 1.94E+02 7.38E+01 1.22E+02 4.68E+01 8.01E+01 1.22E+02 4.68E+01 3.27E+01 3.27E+01 3.27E+01 3.27E+01 3.27E+01 3.27E+01 3.27E+01 3.27E+01 3.27E+01 3.27E+01 3.27E+01 3.27E+01 3.27E+01 3.27E+02 3.36E+02 2.48E+02 3.36E+0	0.1 Delta 18 % 27.4 85.1 34.1 34.1 34.1 34.1 34.1 35.2 43.9 51.1 89.4 64.1 7.2 57.3 91.2 37.2 51.2 37.2 51.2 37.2 51.7 127.9 105.3 84.6 67.7 126.5 121.1 156.4 124.5 121.1 156.4 124.5 121.1 156.3 84.6 67.7 126.5 121.1 156.4 124.5 121.1 156.3 84.6 67.7 156.3 149.1 156.4 149.1 156.4 149.4 157.3 177.2 127.9 105.3 84.6 67.7 126.3 149.1 156.4 124.5 121.1 156.4 124.5 121.1 156.4 124.5 121.1 156.4 124.5 121.1 156.4 124.5 121.1 156.4 124.5 121.1 156.4 124.5 121.1 156.4 124.5 121.1 156.4 124.5 121.1 156.4 124.5 121.1 156.4 124.5 121.1 156.4 149.1 156.4 124.5 121.1 156.4 127.7 127.9 19.8 19.4 -5.6 27.7 13.3 13.3 14.5 124.5	5.0 ★ 18 (2s) % 7.2 8.7 17.9 10.3 11.4 14.3 10.2 12.7 6.7 9.1 4.7 6.8 5.1 5.6 5.3 4.4 8.2 6.3 6.0 6.5 7.5 9.9 7.5 7.3 6.6 7.7 9.3 11.6 14.9 11.8 12.4 11.7 11.6 11.8 12.4 11.7 11.8 12.4 11.7 11.8 12.4 11.7 11.8 12.4 11.7 11.8 12.4 11.7 11.8 12.4 1	110.5           Delta 17           %           155.6           214.2           195.8           168.1           239.0           195.3           174.2           190.1           186.7           188.9           157.9           213.5           131.6           157.4           197.6           205.5           184.2           194.3           286.6           216.1           263.5           254.0           81.1           10.0           110.4           91.2           60.2           69.8           67.6           87.3           128.1	a.1 <b>±17 (2s)</b> <b>%</b> 16.3 19.6 39.7 23.3 25.4 20.0 22.9 28.7 15.4 20.9 10.7 10.8 10.6 22.9 10.1 14.6 22.9 17.1 16.9 17.0 16.9 17.0 20.0 20.7 15.4 20.7 15.4 20.7 15.4 20.7 15.4 20.9 10.1 14.8 16.6 22.9 17.0 16.0 21.0 20.0 20.7 15.4 20.7 15.4 20.7 10.7 10.8 10.6 20.9 10.1 14.8 16.6 22.9 17.0 17.0 20.0 20.7 20.3 24.4 27.4 27.4 28.7 27.4 2
FR35 FR35 Hot Spot 3 Hot Spot 10 Hot Spot 10 Hot Spot 13 Hot Spot 13 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 22 Randomm Area 10 Randomm Area 11 Randomm Area 13 Randomm Area 13 Randomm Area 13 Randomm Area 16 Randomm Area 17 Randomm Area 18 Randomm Area 23 Randomm Area 21 Randomm Area 23 Randomm Area 23 Randomm Area 24 Hot Spot 12 Hot Spot 14 Hot Spot 15 Hot Spot 15 Hot Spot 18 Randomm Area 1 Randomm Area 27 Hot Spot 12 Hot Spot 12 Hot Spot 18 Randomm Area 2 Hot Spot 18 Randomm Area 2 Hot Spot 18 Hot Spot 18 Randomm Area 1 Randomm Area 1 Randomm Area 2 Hot Spot 18 Randomm Area 1 Randomm Area 1 Hot Spot 18 Randomm Area 1 Randomm Area 1 Randomm Area 1 Randomm Area 1 Randomm Area 1 Hot Spot 18 Randomm Area 1 Randomm Area 1 Randomm Area 1 Hot Spot 18 Randomm Area 1 Randomm Area	Sample Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer On Si Wafer Hot Spot on Si Wafer	160 Tot. 8.71E+06 5.75E+06 1.42E+06 3.35E+06 2.79E+06 4.29E+06 4.29E+06 4.29E+06 4.29E+06 5.28E+06 1.05E+07 1.61E+07 2.38E+07 1.43E+07 1.43E+07 1.43E+07 1.31E+07 7.59E+06 4.20E+06 7.29E+06 7.29E+06 7.38E+06 3.31E+06 3.31E+06 3.37E+06 3.37E+06 3.37E+06 3.35E+06 3.35E+06 1.43E+06 3.35E+06 1.43E+06 3.35E+06 1.43E+06 3.35E+06 1.43E+06 3.35E+06 1.43E+06 3.35E+06 1.43E+06 3.35E+06 1.43E+06 3.35E+06 1.43E+06 3.35E+06 1.43E+06 3.35E+06 1.43E+06 3.35E+06 1.43E+06 3.35E+06 1.43E+06 3.35E+06 1.43E+06 3.35E+06 1.43E+06 3.35E+06 1.43E+06 3.35E+06 1.43E+06 3.35E+06 1.43E+06 3.35E+06 1.43E+06 3.35E+06 1.43E+06 3.35E+06 3.3	160 Cps 1.54E+05 1.25E+05 1.25E+05 1.32E+05 9.33E+04 1.32E+04 3.38E+04 3.318E+04 3.318E+04 3.318E+04 3.345E+04 3.345E+04 3.345E+04 3.345E+04 3.345E+04 3.345E+04 3.345E+04 3.345E+04 3.345E+04 3.345E+04 3.345E+04 1.34E+04 1.34E+04 1.34E+04 1.34E+04 1.34E+04 1.34E+04 1.34E+05 1.15E+05	170 Tot. 3.74E+03 2.59E+03 6.33E+02 1.54E+03 9.78E+02 1.91E+03 1.22E+03 2.33E+03 8.59E+03 1.22E+03 4.32E+03 4.32E+03 4.32E+03 4.85E+03 3.45E+03 3.45E+03 3.44E+03 2.22E+03 1.33E+03 3.44E+03 3.44E+03 3.54E+03 3.44E+03 3.44E+03 3.54E+03 3.44E+03 3.44E+03 3.51E+02 1.33E+03 1.33E+	170 Cps 6.59E+01 5.64E+01 7.47E+01 4.30E+01 3.385E+01 4.30E+01 3.385E+01 1.37E+01 2.32E+01 1.31E+01 2.32E+01 1.31E+01 2.36E+01 1.31E+01 2.36E+01 1.53E+01 1.53E+01 1.45E+01 1.45E+01 1.45E+01 1.45E+01 1.45E+01 1.45E+01 1.45E+01 1.45E+01 1.45E+01 1.45E+01 1.45E+01 1.45E+01 1.45E+01 1.45E+01 1.45E+01 1.45E+01 1.45E+01 1.55E+01 3.65E+01 3.65E+01 3.05E+01 3.	180 Tot. 1.91E+04 1.31E+04 3.14E+03 3.14E+03 9.45E+03 9.45E+03 9.45E+03 9.45E+03 9.45E+03 2.20E+04 1.20E+04 1.20E+04 1.21E+04 3.16E+04 3.16E+04 3.16E+04 3.16E+04 3.16E+04 3.16E+04 1.22E+04 2.32E+04 1.32E+04 1.32E+04 1.32E+04 1.32E+04 1.32E+04 1.32E+04 3.36E+04 1.32E+04 3.36E+04 1.32E+04 3.36E+04 1.32E+04 3.36E+	180 Cps 3.36E+02 2.89E+02 3.70E+02 2.16E+02 1.94E+02 3.09E+02 3.09E+02 1.194E+02 3.09E+02 1.194E+02 6.87E+01 1.22E+02 4.68E+01 8.01E+01 8.09E+01 3.27E+01 5.68E+01 3.27E+01 5.68E+01 3.27E+01 5.68E+01 3.36E+02 2.34E+02 2.34E+02 3.30E+02 2.34E+02 3.30E+02 2.34E+02 3.30E+02 2.34E+02 3.36E+02 2.34E+02 3.36E+02 2.34E+02 3.36E+02 2.34E+02 3.36E+02 2.34E+02 3.36E+02 2.34E+02 3.36E+02 2.34E+02 3.36E+02 2.34E+02 3.36E+02 2.34E+02 3.36E+02 2.34E+02 3.36E+02 2.34E+02 3.36E+02 2.34E+02 3.36E+02 3.36E+02 2.34E+02 3.36E+02 3.	0.1 Delta 18 % 27.4 85.1 34.1 41.7 85.4 35.2 43.9 51.1 89.4 64.1 27.3 91.2 37.2 51.2 37.2 51.2 37.2 51.7 127.9 105.3 84.6 67.7 105.8 149.1 156.4 121.1 70.9 105.3 84.6 67.7 105.8 149.1 156.4 121.1 156.4 121.1 156.4 121.1 156.5 19.4 157.7 19.8 0.5 19.4 19.4 19.5 19.5 19.4 19.5 10.5 1	5.0 ± 18 (2s) % 7.2 8.7 17.9 10.3 11.4 14.3 10.2 12.7 6.7 9.1 4.7 6.7 9.1 4.7 6.8 5.1 5.6 5.3 4.4 8.2 6.3 4.4 8.2 6.3 9.9 7.5 9.9 7.5 9.9 7.5 9.3 11.6 14.9 11.8 12.7 1.6 1.6 1.6 1.6 1.6 1.6 1.6 1.6	110.5           Delta 17           %           155.6           214.2           195.3           174.2           190.1           186.7           188.9           213.5           129.5           131.6           157.9           131.6           157.8           194.3           286.6           216.1           263.5           184.2           194.3           286.6           213.5           254.0           214.1           104.2           199.3           213.5           254.0           261.1           100.4           91.2           60.2           60.2           67.6           87.3           128.1           117.2	s.1         ±17 (2s)         ‰         16.3         19.6         39.7         23.3         25.4         30.7         23.3         25.4         30.7         15.4         20.7         15.4         20.7         15.4         20.7         15.4         20.7         15.4         20.7         15.4         20.7         15.4         20.7         15.4         20.7         15.4         20.7         15.4         20.7         14.4         13.7         14.8         16.6         17.9         15.0         17.0         21.2         26.3         34.4         27.4         21.2         26.3         34.4         27.4         21.2         27.4         41.1         23.5.7
FR35 FR35 Hot Spot 3 Hot Spot 10 Hot Spot 10 Hot Spot 10 Hot Spot 11 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 21 Hot Spot 21 Randomm Area 10 Randomm Area 11 Randomm Area 13 Randomm Area 13 Randomm Area 13 Randomm Area 13 Randomm Area 14 Randomm Area 15 Randomm Area 15 Randomm Area 16 Randomm Area 17 Randomm Area 18 Randomm Area 18 Randomm Area 19 Randomm Area 20 Randomm Area 21 Randomm Area 21 Randomm Area 21 Randomm Area 21 Randomm Area 24 Randomm Area 24 Hot Spot 12 Hot Spot 12 Hot Spot 12 Hot Spot 14 Hot Spot 14 Hot Spot 15 Hot Spot 14 Hot Spot 5 Hot Spot 14 Hot Spot 5 Hot Spot 14 Hot Spot 5 Hot Spot 5 Hot Spot 14 Hot Spot 5 Hot Spot 12 Hot Spot 14 Hot Spot 5 Hot Spot 14 Hot Spot 5 Hot Spot 14 Hot Spot 5 Hot Spot 14 Hot Spot 5 Hot Spot 7 Hot Spot 14 Hot Spot 7 Hot Spot 7 Hot Spot 14 Hot Spot 7 Hot Sp	Sample Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer On Si Wafer Hot Spot on Si Wafer On Si W	160 Tot. 8.71E+06 5.75E+06 1.42E+06 4.26E+06 4.26E+06 4.29E+06 4.29E+06 4.29E+06 4.29E+06 4.29E+06 4.29E+06 5.28E+06 5.28E+06 5.28E+06 1.04E+07 7.59E+06 7.27E+06 7.39E+07 6.13E+06 7.27E+06 7.39E+06 7.3	160 Cps 1.54E+05 1.25E+05 1.24E+05 1.32E+05 1.32E+04 3.03E+04 3.03E+04 3.03E+04 3.03E+04 3.03E+04 3.03E+04 3.03E+04 3.03E+04 3.05E+04 3.05E+04 3.28E+04 2.34E+04 3.28E+04 2.34E+04 2.34E+04 2.34E+04 2.34E+04 1.34E+04 2.34E+04 1.34E+04 1.34E+04 1.34E+05 1.15E+0	170 Tot. 3.74E+03 2.59E+03 6.33E+02 1.54E+03 9.78E+02 1.91E+03 1.22E+03 4.20E+03 2.33E+03 8.59E+03 1.22E+03 4.32E+03 8.59E+03 3.63E+03 3.64E+03 3.41E+03 3.41E+03 3.44E+03 1.32E+03 1.33E+03 1.35E+	170 Cps 6.59E+01 5.64E+01 7.47E+01 5.38E+01 4.30E+01 3.38E+01 6.18E+01 2.32E+01 1.37E+01 2.32E+01 1.37E+01 2.36E+01 1.37E+01 2.36E+01 1.31E+01 1.31E+01 1.51E+01 6.03E+00 1.84E+01 1.11E+01 1.41E+01 1.41E+01 1.41E+01 1.55E+01 4.76E+01 3.55E+01 4.76E+01 3.55E+01 4.76E+01 3.55E+01 2.55E+01 4.76E+01 3.55E+01 2.55E+01 4.76E+01 3.55E+01 2.55	180 Tot. 1.91E+04 1.31E+03 3.14E+03 9.45E+03 9.45E+03 9.45E+03 9.45E+03 9.45E+03 9.45E+03 2.20E+04 1.42E+04 1.20E+04 1.31E+04 3.16E+04 3.16E+04 3.31E+04 2.21E+04 1.31E+04 1.32E+	180 Cps 3.36E+02 2.89E+02 3.70E+02 2.75E+02 2.16E+02 1.94E+02 3.09E+02 3.09E+02 3.09E+02 3.09E+02 3.09E+02 1.19E+02 7.38E+01 1.22E+02 1.00E+02 1.66E+02 1.66E+02 1.66E+01 5.98E+01 7.33E+01 5.98E+01 5.98E+01 5.98E+01 5.98E+01 5.36E+02 2.88E+02 2.88E+02 2.88E+02 2.88E+02 2.88E+02 2.88E+02 2.88E+02 2.88E+02 2.34E+02 3.00E+02 2.34E+02 3.00E+02 2.34E+02 3.00E+02 2.34E+02 3.00E+02 2.34E+02 3.00E+02 2.34E+02 3.00E+02 2.34E+02 3.00E+02 2.34E+02 3.00E+02 2.34E+02 3.00E+02 2.34E+02 3.00E+02 2.34E+02 3.00E+02 3.00E+02 2.34E+02 3.00E+	0.1           Delta 18           %           27.4           85.1           34.1           41.7           85.4           39.5           51.1           89.4           64.1           79.2           51.2           31.7           127.9           105.3           84.6           67.7           105.3           84.6           67.7           105.3           84.6           67.7           105.3           84.6           67.7           105.3           84.6           67.7           105.3           84.6           67.7           105.3           84.6           67.7           105.3           121.1           70.9           10.5           19.4           2.5.9           -5.6           27.7           59.1           3.3           19.9           59.6           20.5	± 18 (2s)	110.5           Delta 17           %           155.6           214.2           195.8           168.1           239.0           205.3           174.2           190.1           190.1           190.1           186.7           188.7           181.7           183.6           157.9           213.5           131.6           157.9           205.5           184.2           194.3           286.6           216.1           263.5           254.0           81.1           110.4           91.2           60.2           69.8           67.6           87.3           128.1           117.2           1022.2	a.1         ±17 (2s)         ‰         16.3         19.6         39.7         23.3         25.4         30.7         28.7         15.4         20.7         16.6         11.6         12.9         12.1         9.9         12.1         9.9         12.1         9.9         12.1         9.9         15.0         17.0         26.3         34.4         27.4         28.5         27.4         28.5         27.4         28.5         27.4         28.5         27.4         28.5         27.4         28.5         27.4         28.5         27.4         28.5         27.4         28.5         27.4         34.5          12.5
FR35 FR35 Hot Spot 3 Hot Spot 10 Hot Spot 10 Hot Spot 10 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 22 Randomm Area 10 Randomm Area 11 Randomm Area 13 Randomm Area 13 Randomm Area 14 Randomm Area 15 Randomm Area 15 Randomm Area 17 Randomm Area 18 Randomm Area 22 Randomm Area 22 Randomm Area 22 Randomm Area 22 Randomm Area 23 Randomm Area 24 Randomm Area 24 Randomm Area 25 Hot Spot 14 Hot Spot 19 Hot Spot 18 Randomm Area 3 Randomm Area 3 Random Area 3 Randomm Ar	Sample Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer On Si Wafer Hot Spot on Si Wafer Hot Spot on Si Wafer Hot Spot on Si Wafer Hot Spot on Si Wafer On Si Wafer	160 Tot. 8.71E+06 5.75E+06 1.2E+06 3.35E+06 2.18E+06 9.30E+06 9.30E+06 9.30E+06 9.30E+06 9.30E+06 9.30E+06 1.34E+07 1.34E+07 1.34E+07 1.34E+07 1.34E+07 1.34E+07 1.34E+07 1.34E+07 1.34E+07 1.34E+07 1.34E+07 1.34E+07 1.34E+07 1.34E+07 1.34E+07 1.34E+07 1.34E+07 1.34E+06 7.35E+06 2.38E+06 2.38E+06 3.34E+06 2.38E+07 1.38E+07 1.38E+07 1.38E+07 1.38E+07 1.38E+07 1.38E+07 1.38E+07 1.38E+07 1.38E+07 1.38E+07 1.38E+07 1.38E+07 1.38E+07 1.38E+06 2.38	160 Cps 1.54E+05 1.25E+05 1.25E+05 1.24E+05 9.33E+04 8.59E+04 1.39E+05 5.33E+04 3.18E+04 3.18E+04 3.18E+04 3.18E+04 3.18E+04 3.18E+04 4.54E+04 5.24E+04 4.54E+04 3.38E+04 3.38E+04 3.38E+04 2.54E+04 3.38E+04 2.54E+04 1.54E+05 1.15E+05 5.900E+04 1.38E+05 1.15E+05 5.17E+05 7.65E+04 1.11E+05 1.37E+05 3.36E+05 1.11E+05 1.37E+05 3.36E+05 1.11E+05 1.37E+05 3.36E+05 1.37E+05 3.36E+05 1.37E+05 3.36E+05 1.37E+05 3.36E+05 1.37E+05 3.36E+05 1.37E+05 3.36E+05 1.37E+05 3.36E+05 1.37E+05 3.36E+05 1.37E+05 3.36E+04 3.36E+05 3.36E+05 3.36E+04 3.36E+04 3.36E+04 3.36E+04 3.36E+04 3.36E+04 3.36E+04 3.36E+04 3.36E+04 3.36E+04 3.36E+04 3.36E+04 3.36E+04 3.36E+04 3.36E+04 3.36E+04 3.36E+05 3.36E+04 3.36E+04 3.36E+05 3.36E+04 3.36E+04 3.36E+05 3.36E+05 3.36E+05 3.36E+05 3.36E+05 3.36E+05 3.36E+05 3.36E+04 3.36E+04 3.36E+04 3.36E+04 3.36E+05 3.36E+05 3.36E+05 3.37E+05 3.36E+05 3.37E+05 3.37E+05 3.37E+05 3.37E+05 3.36E+05 3.37E+05 3.37E+05 3.36E+05 3.37E+05 3.36E+05 3.3	170 Tot. 3.74E+03 2.59E+03 6.33E+02 1.54E+03 9.78E+02 1.54E+03 9.78E+02 1.54E+03 9.78E+02 1.22E+03 4.20E+03 4.23E+03 4.23E+03 6.00E+03 6.079E+03 1.03E+04 2.33E+03 5.34E+03 3.54E+03 3.54E+03 3.54E+03 3.54E+03 3.54E+03 1.32E	170 Cps 6.59E+01 5.64E+01 7.47E+01 5.38E+01 4.30E+01 5.38E+01 4.30E+01 3.38E+01 1.41E+01 1.37E+01 2.32E+01 1.31E+01 2.36E+01 1.91E+01 2.36E+01 1.45E+01 1.15E+01 1.15E+01 1.15E+01 1.15E+01 1.15E+01 1.54E+01 1.41E+01 1.54E+01 1.54E+01 1.54E+01 1.54E+01 1.55E+01 3.65E+01 3.52E+01 3.52E+01 3.52E+01 3.55	180 Tot. 1.91E+04 1.31E+03 3.14E+03 3.14E+03 9.54E+03 4.92E+03 9.54E+03 6.25E+03 2.02E+04 1.20E+04 1.20E+04 2.36E+04 3.61E+04 3.61E+04 3.61E+04 3.61E+04 2.32E+04 1.39E+04 1.39E+04 1.39E+04 1.39E+04 1.39E+04 1.59E+04 1.59E+04 3.30E+03 3.24E+04 1.59E+	180 Cps 3.36E+02 2.89E+02 3.70E+02 2.75E+02 2.75E+02 2.75E+02 2.76E+02 1.94E+02 1.94E+02 7.03E+01 1.19E+02 7.03E+01 1.42E+02 6.87E+01 1.22E+02 1.06E+02 1.05E+01 2.26E+02 1.05E+01 1.05E+0	Detta 18 27.4 85.1 34.1 41.7 85.4 43.9 41.7 85.4 43.9 41.7 85.4 43.9 41.7 85.4 43.9 40.2 57.3 91.2 51	± 18 (2s) ∞ 7.2 8.7 17.9 10.3 11.4 14.3 10.2 12.7 6.7 9.1 4.7 6.8 5.1 5.6 5.3 4.4 8.2 6.3 6.3 6.3 6.5 7.5 9.9 7.5 7.3 6.6 7.7 9.3 11.6 14.9 14.7 15.6 5.3 15.6 5.3 15.6 5.3 16.6 5.7 5.7 5.7 5.7 5.7 5.7 5.7 5.7	110.5           Delta 17           %           155.6           214.2           192.5           168.1           239.0           195.3           174.2           190.1           186.9           157.9           213.5           131.6           157.4           197.5           131.6           215.5           131.6           157.4           197.5           205.5           131.6           216.1           266.6           216.1           266.6           216.1           266.6           216.1           269.8           67.6           87.3           128.1           117.2           132.6           129.0	<ul> <li>a.1</li> <li>a.1</li> <li>a.1</li> <li>a.1</li> <li>a.1</li> <li>a.3</li> <li>a.9</li> <li>a.6</li> <li>a.3</li> <li>a.6</li> <li>a.6</li> <li>a.9</li> <li>a.7</li> <li>a.6</li> <li>a.6</li> <li>a.9</li> <li>a.1</li> <li>a.6</li> <li>a.9</li> <li>a.1</li> <li>a.6</li> <li>a.9</li> <li>a.1</li> <li>a.6</li> <li>a.6</li></ul>
FR35 FR35 Hot Spot 3 Hot Spot 10 Hot Spot 10 Hot Spot 10 Hot Spot 13 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 22 Randomm Area 10 Randomm Area 11 Randomm Area 13 Randomm Area 13 Randomm Area 13 Randomm Area 13 Randomm Area 15 Randomm Area 18 Randomm Area 19 Randomm Area 20 Randomm Area 20 Randomm Area 20 Randomm Area 21 Randomm Area 20 Randomm Area 20 Randomm Area 21 Randomm Area 20 Randomm Area 21 Randomm Area 23 Randomm Area 23 Randomm Area 23 Randomm Area 23 Randomm Area 21 Hot Spot 12 Hot Spot 12 Hot Spot 12 Hot Spot 18 Randomm Area 3 Randomm Area 3 Randomm Area 3 Randomm Area 7	Sample Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer On Si Wafer Hot Spot on Si Wafer On Si Wafer	160 Tot. 8.71E+06 5.75E+06 1.42E+06 4.26E+06 4.26E+06 4.26E+06 4.26E+06 9.50E+06 5.28E+06 9.50E+06 5.28E+06 1.54E+07 1.34E+07 1.34E+07 1.34E+07 1.34E+07 1.34E+07 1.34E+07 1.34E+06 4.20E+06 4.20E+06 5.25E+06 3.35E+07 3.35E+07 3.35E+07 3.35E+07 3.35E+07 3.35E+07 3.35E+07 3.35E+07 3.35E+07 3.35E+07 3.35E+06 3.3	160 Cps 1.54E+05 1.25E+05 1.25E+05 1.25E+05 1.24E+05 9.33E+04 1.34E+05 9.33E+04 1.34E+05 9.33E+04 3.318E+04 3.318E+04 3.318E+04 3.34E+04 4.34E+04 4.34E+04 1.34E+04 3.345E+04 3.345E+04 3.345E+04 3.345E+04 1.34E+05 1.15E+05 9.00E+04 1.34E+05 1.15E+05 9.00E+04 1.34E+05 1.15E+05 9.00E+04 1.34E+05 1.15E+05 1.35E+	170 Tot. 3.74E+03 2.59E+03 6.33E+02 1.54E+03 9.78E+02 1.54E+03 9.78E+02 1.54E+03 2.33E+03 8.59E+03 1.22E+03 4.13E+03 7.43E+03 4.85PE+03 1.34E+04 2.33E+03 3.41E+03 3.41E+03 3.42E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 1.35E+04 1.33E+04 1.23E+03 1.45E+03 1.45E+03 1.45E+03 1.45E+03 1.45E+03 1.45E	170 Cps 6.59E+01 5.64E+01 7.47E+01 5.38E+01 4.30E+01 3.38E+01 2.32E+01 1.31E+01 2.32E+01 1.31E+01 2.36E+01 1.31E+01 2.36E+01 1.32E+01 1.52E+01 6.38E+01 1.55E+01 5.45E+01 3.05E+01 5.45E+01 3.05E+01 2.35	180 Tot. 1.91E+04 1.31E+03 3.14E+03 9.45E+03 9.54E+03 9.54E+03 9.54E+03 9.54E+03 9.54E+03 9.54E+04 1.20E+04 3.316E+04 3.316E+04 3.316E+04 3.316E+04 3.316E+04 1.32E+04 1.32E+04 1.32E+04 1.32E+04 1.32E+04 1.35E+04 1.35E+04 1.35E+04 1.35E+04 3.316E+03 3.34E+04 3.34E+04	180 Cps 3.36E+02 2.89E+02 3.70E+02 2.75E+02 2.75E+02 2.75E+02 2.75E+02 2.75E+02 2.75E+02 2.75E+02 1.94E+02 7.38E+01 1.22E+02 6.87E+01 1.22E+02 4.66E+02 4.66E+02 4.66E+02 4.68E+01 3.7E+01 3.7E+01 3.56E+01 2.84E+02 2.98E+01 1.95E+02 2.98E+01 1.95E+02 2.98E+01 1.95E+02 2.98E+01 1.95E+02 3.00E+02 1.95E+02 2.98E+01 1.95E+02 3.00E+02 1.95E+02 3.00E+02 1.95E+01 1.55E+02 1.55E+02	0.1 Delta 18 % 27.4 85.1 34.1 37.2 37.2 37.2 31.7 127.9 105.3 84.6 67.7 127.9 105.8 149.1 156.4 124.5 121.1 156.4 124.5 124.5 124.5 124.5 124.5 124.5 124.5 124.5 124.5 124.5 125.4 125.6 27.7 13.3 19.9 156.4 27.7 25.6 27.7 25.7	3.0 ± 18 (2s) % 7.2 8.7 17.9 10.3 11.4 14.3 10.2 12.7 6.7 9.1 4.7 6.8 5.1 5.6 5.3 4.4 8.2 6.3 6.0 6.5 5.9 9 7.5 7.3 6.6 7.9 9.1 4.4 8.2 6.3 6.0 6.7 9.9 7.5 7.3 6.6 7.9 9.1 14.4 8.2 6.3 6.0 6.5 7.3 6.6 7.9 9.1 14.4 8.2 6.3 6.0 6.5 7.3 6.6 7.5 9.1 14.4 8.2 6.3 6.0 6.5 7.3 6.6 7.5 9.1 14.4 8.2 6.3 6.0 6.5 7.5 9.1 14.4 8.2 6.3 6.0 6.5 7.5 9.1 14.4 8.2 6.3 6.0 6.5 7.5 9.1 14.4 8.2 6.3 6.0 6.5 7.3 6.6 7.7 9.3 11.6 14.9 11.8 12.4 11.7 11.6 14.9 11.8 12.4 11.7 11.6 14.9 11.8 12.4 11.7 11.6 14.3 6.8 14.3 6.8 14.3 6.8 14.3 6.8 14.4 14.7 14.5 15.6 7.3 6.7 9.3 11.6 14.9 11.8 12.4 14.7 14.7 15.6 7.5 9.5 7.3 6.6 7.7 9.3 11.6 14.9 11.8 12.4 14.7 14.3 6.8 14.9 11.8 12.4 14.7 14.3 6.8 14.3 6.2 5.4 4.9 14.3 6.2 5.4 4.9 14.3 6.2 5.4 4.9 14.3 6.2 5.4 4.9 14.3 15.6 15.7 1	110.5           Delta 17           %           155.6           214.2           195.8           168.1           239.0           195.3           174.2           190.1           186.7           188.9           157.9           213.5           131.6           157.4           197.6           205.5           184.2           194.4           286.6           216.1           263.5           254.0           81.1           10.4           91.2           60.2           69.8           67.6           87.3           128.1           117.2           102.2           132.6           129.0           134.1	<ul> <li>a.1</li> <li>a.1</li> <li>a.1</li> <li>a.1</li> <li>a.1</li> <li>a.3</li> <li>a.6</li> <li>a.9</li> <li>a.7</li> <li>a.3</li> <li>a.4</li> <li>a.7</li> <li>a.4</li> <li>a.6</li> <li>a.2</li> <li>a.9</li> <li>a.1</li> <li>a.4</li> <li>a.6</li> <li>a.6</li> <li>a.9</li> <li>a.1</li> <li>a.4</li> <li>a.6</li> <li>a.4</li> <li>a.7</li> <li>a.4</li> <li>a.4</li></ul>
FR35 FR35 Hot Spot 3 Hot Spot 10 Hot Spot 10 Hot Spot 13 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 22 Randomm Area 10 Randomm Area 10 Randomm Area 11 Randomm Area 13 Randomm Area 13 Randomm Area 16 Randomm Area 17 Randomm Area 18 Randomm Area 21 Randomm Area 21 Randomm Area 21 Randomm Area 23 Randomm Area 23 Randomm Area 24 Hot Spot 12 Hot Spot 13 Randomm Area 3 Randomm Area 3 Randomm Area 7 Randomm Area 8	Sample Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer On Si Wafer Hot Spot on Si Wafer Hot Spot on Si Wafer Hot Spot on Si Wafer On Si Wafer	160 Tot. 8.71E+06 5.75E+06 1.42E+06 3.35E+06 2.79E+06 4.29E+06 4.29E+06 4.29E+06 4.29E+06 4.29E+06 5.28E+06 1.05E+07 1.43E+07 1.43E+07 1.43E+07 1.43E+07 1.43E+07 1.32E+07 1.32E+07 1.32E+07 1.32E+07 1.32E+06 3.32E+07 1.42E+06 3.32E+06 3.32E+06 3.32E+06 3.32E+06 3.32E+06 3.32E+07 1.42E+07 3.42E+07 3.42E+07 1.42E+07 3.42E+07 3.42E+07 1.42E+07 3.42E+07 3.42E+07 1.42E+07 3.42E+07 3.42E+07 1.42E+07 3.42E+07 1.4	160 Cps 1.54E+05 1.25E+05 1.25E+05 1.32E+05 9.33E+04 1.34E+05 9.33E+04 3.38E+04 3.318E+04 3.318E+04 3.318E+04 3.345E+04 3.345E+04 3.345E+04 3.345E+04 3.345E+04 3.345E+04 3.345E+04 3.345E+04 3.345E+04 3.345E+04 1.34E+04 1.34E+04 1.34E+04 3.345E+04 3.355E+04 3.345E+04 3.355E+04 3.345E+04 3.355E+04 3.345E+04 3.355E+04 3.345E+04 3.355E+04 3.345E+04 3.355E+04 4.345E+04 4.345E+04 4.345E+04 4.345E+04 4.345E+04 4.345E+04 4.345E+04 4.345E+04 4.345E+04 4.345E+04 4.345E+04 4.345E+04 4.345E+04 3.355E+04 3.355E+04 3.355E+04 3.355E+04 3.355E+04 3.355E+04 3.355E+04 3.355E+04 3.355E+04 3.355E+04 3.355E+04 3.355E+04 3.355E+04 3.355E+04 3.355E+04 3.355E+04 3.355E+04 3.355E+04 3.355E+04	170 Tot. 3.74E+03 2.59E+03 6.33E+02 1.54E+03 9.78E+02 1.54E+03 9.78E+02 1.54E+03 2.33E+03 2.33E+03 8.59E+03 1.22E+03 4.32E+03 4.32E+03 4.32E+03 3.45E+03 3.45E+03 3.44E+03 2.22E+03 1.43E+03 3.44E+03 2.44E+02 2.22E+03 1.43E+03 3.44E+03 2.44E+02 2.22E+03 1.43E+03 3.44E+03 2.54E+03 3.44E+03 2.54E+03 3.51E+02 1.33E+03 5.51E+02 1.33E+03 5.51E+02 1.54E+03 5.51E+03 7.99E+03 1.52E+	170 Cps 6.59E+01 5.64E+01 7.47E+01 4.30E+01 3.385E+01 4.30E+01 3.385E+01 1.37E+01 2.32E+01 1.31E+01 2.36E+01 1.31E+01 2.36E+01 1.31E+01 2.36E+01 1.32E+01 1.41E+01 1.45E+01 1.45E+01 1.41E+01 1.41E+01 1.41E+01 1.41E+01 1.41E+01 1.41E+01 1.41E+01 1.42E+01 4.27E+01 4.	180 Tot. 1.91E+04 1.31E+04 3.14E+03 3.14E+03 9.45E+03 9.45E+03 9.45E+03 9.45E+03 9.45E+03 2.20E+04 1.20E+04 1.20E+04 2.16E+04 3.16E+04 3.16E+04 3.16E+04 3.16E+04 1.20E+04 1.47E+04 2.52E+04 2.38E+04 1.38E+04 1.58E+04 1.58E+04 3.30E+03 9.38E+03 3.30E+03 9.38E+03 3.30E+03 9.38E+03 3.30E+04 4.52E+03 2.13E+04 4.52E+03 3.30E+03 9.38E+03 3.30E+03 9.38E+04 3.30E+04 4.52E+04 4.52E+04 3.30E+04 4.52E+04 3.30E+04 4.52E+04 3.30E+04 4.52E+04 3.30E+04 4.52E+04 3.30E+04 4.52E+03 3.30E+04 4.52E+04 3.30E+04 4.52E+04 3.30E+04 4.52E+04 3.30E+04 4.52E+04 3.30E+04 4.52E+04 3.30E+04 4.52E+04 3.30E+04 4.52E+04 3.30E+04 4.52E+04 3.30E+	180 Cps 3.36E+02 2.89E+02 3.70E+02 2.75E+02 2.16E+02 1.94E+02 3.09E+02 3.09E+02 1.19E+02 3.09E+02 1.19E+02 6.87E+01 1.22E+02 1.166E+02 4.68E+01 3.09E+01 3.56E+01 3.27E+01 5.68E+01 3.27E+01 5.68E+01 3.38E+02 2.34E+02 2.34E+02 1.95E+02 2.34E+02 1.95E+02 2.34E+02 1.95E+02 2.34E+01 1.95E+02 1.95E+02 1.95E+02 1.95E+02 1.95E+02 1.95E+02 1.95E+02 1.95E+02 1.95E+02 1.95E+02 1.95E+02 1.95E+02 1.95E+02 1.95E+02 1.95E+02 1.95E+02 1.95E+02 1.95E+02 1.95E+02 1.95E+	0.1 Delta 18 % 27.4 85.1 34.1 41.7 85.4 35.1 43.9 51.1 89.4 64.1 27.3 91.2 57.3 91.2 37.2 51.2 37.2 51.2 37.2 51.7 127.9 105.3 84.6 67.7 105.8 149.1 156.4 121.1 70.9 105.3 84.6 67.7 105.8 149.1 156.4 121.1 70.9 19.8 0.5 19.4 19.8 0.5 19.4 19.9 59.1 33 19.9 59.1 33 35.7 36.2 19.8 19.9 19.8 19.9 10.5 19.9 10.5 19.9 10.5 19.9 10.5 19.9 10.5 19.9 10.5 19.9 10.5 19.9 10.5 19.9 10.5 19.9 10.5 19.9 10.5 19.9 10.5 19.9 10.5 1	5.0 ± 18 (2s) % 7.2 8.7 17.9 10.3 11.4 10.2 12.7 6.7 9.1 4.7 6.7 9.1 4.7 6.8 5.1 5.6 5.3 4.4 8.2 6.3 4.4 8.2 6.3 9.9 7.5 9.9 7.5 9.9 7.5 9.3 11.6 14.9 11.8 12.7 1.6 1.6 1.6 1.6 1.6 1.6 1.6 1.6	110.5           Delta 17           %           155.6           214.2           195.3           174.2           190.1           186.7           188.9           213.5           129.5           131.6           157.9           213.5           184.2           194.3           286.6           216.1           263.5           184.2           194.3           286.6           216.1           263.5           254.0           214.1           10.4           91.2           60.2           69.5           87.3           128.1           110.4           91.2           60.2           67.6           87.3           128.1           117.2           102.2           132.6           129.0           134.1           137.3	a.1         ★17 (2s)         %         16.3         19.6         39.7         23.3         25.4         30.7         23.3         25.4         30.7         15.4         20.7         15.4         20.7         15.4         20.7         15.4         20.7         15.4         20.7         15.4         20.7         15.4         20.7         15.4         20.7         15.4         20.7         15.4         20.7         14.4         13.7         14.8         16.6         17.9         15.0         17.0         15.0         17.0         21.2         26.3         34.4         11.2         31.5.7         31.5.7         31.5.7         31.5.7         31.5.7         31.5.7         31.5.7
FR35 FR35 Hot Spot 3 Hot Spot 10 Hot Spot 10 Hot Spot 11 Hot Spot 11 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 21 Randomm Area 10 Randomm Area 11 Randomm Area 13 Randomm Area 13 Randomm Area 13 Randomm Area 13 Randomm Area 16 Randomm Area 17 Randomm Area 18 Randomm Area 21 Randomm Area 20 Randomm Area 21 Randomm Area 22 Randomm Area 23 Randomm Area 23 Randomm Area 21 Randomm Area 22 Randomm Area 23 Randomm Area 23 Randomm Area 24 Randomm Area 23 Randomm Area 3 Randomm Area 7 Randomm Area 3 Randomm Area 7 Randomm Area 8 Randomm Area 8 Randomm Area 8 Randomm Area 8	Sample Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer On Si Wafer Hot Spot on Si Wafer Hot Spot on Si Wafer Hot Spot on Si Wafer On Si Wafer	160 Tot. 8.71E+06 5.75E+06 1.42E+06 4.26E+06 4.26E+06 4.29E+06 2.79E+06 4.29E+06 4.29E+06 4.29E+06 4.29E+06 4.29E+06 5.28E+06 5.28E+06 1.05E+07 1.43E+07 1.43E+07 1.43E+07 1.43E+07 1.43E+07 1.43E+07 1.43E+07 1.43E+07 1.21E+07 1.21E+07 3.35E+06 3.3	160 Cps 1.54E+05 1.54E+05 1.25E+05 1.24E+05 9.33E+04 1.39E+04 1.39E+04 3.03E+04 3.03E+04 3.03E+04 3.03E+04 3.03E+04 3.03E+04 3.04E+04 3.05E+04 3.28E+04 3.28E+04 3.28E+04 3.28E+04 3.28E+04 3.28E+04 3.28E+04 3.28E+04 1.34E+04 3.38E+04 2.50E+04 1.34E+04 3.36E+04 3.36E+04 3.36E+04 3.36E+04 3.36E+04 3.3E+04 3.3E+04 3.3E+04 3.36E+04 3.36E+04 3.3E+	170 Tot. 3.74E+03 2.95E+03 6.33E+02 1.54E+03 9.78E+02 1.91E+03 1.22E+03 2.32E+03 2.32E+03 2.32E+03 2.32E+03 2.32E+03 2.32E+03 3.43E+03 3.679E+03 3.44E+03 3.44E+03 3.44E+02 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.42E+03 3.42E+03 3.42E+03 3.42E+03 3.42E+03 3.42E+03 3.42E+03 3.42E+03 3.42E+03 3.42E+03 3.42E+03 3.42E+03 3.42E+03 3.42E+03 3.42E+03 3.42E+03 3.42E+03 3.42E+03 3.40E+03 3.40E+03 3.59E+03 1.52E+03 4.52E+03 4.52E+03 4.52E+03 4.52E+03 3.42E+03 4.52E+03 3.42E+03 4.52E+03 3.42E+03 4.52E+03 3.42E+03 4.52E+03 3.42E+03 4.52E+03 3.42E+03 4.52E	170 Cps 6.59E+01 5.64E+01 7.47E+01 5.38E+01 4.30E+01 3.385E+01 2.32E+01 2.32E+01 1.31E+01 2.32E+01 2.36E+01 1.31E+01 2.36E+01 1.31E+01 2.36E+01 1.51E+01 1.603E+00 1.32E+01 4.36E+01 4.36E+01 4.36E+01 4.36E+01 4.36E+01 4.36E+01 4.36E+01 2.35E+01 2.36E+01 2.	180 Tot. 1.91E+04 1.31E+03 3.14E+03 9.45E+03 9.45E+03 9.45E+03 9.45E+03 9.45E+03 9.45E+03 9.45E+03 9.45E+04 1.20E+04 1.20E+04 1.20E+04 1.20E+04 1.31E+04 1.31E+04 1.31E+04 1.31E+04 1.32E+04 1.32E+04 1.32E+04 1.52E+	180 Cps 3.36E+02 2.89E+02 3.70E+02 2.75E+02 2.16E+02 1.94E+02 3.09E+02 3.09E+02 3.09E+02 3.09E+02 1.19E+02 3.09E+02 1.12E+02 1.15E+02 1.66E+02 4.68E+01 3.27E+01 7.43E+02 7.43E+02 7.44	0.1           Delta 18           %           27.4           85.1           34.1           41.7           85.4           43.9           51.1           89.4           64.1           79.2           51.2           31.7           127.9           105.3           84.6           67.7           105.3           84.6           67.7           105.3           121.1           70.9           105.3           124.1           70.9           105.3           121.1           70.9           19.8           0.5           19.4           5.9           -5.6           27.7           59.1           33.3           19.9           59.6           27.7           36.2           42.6           18.5	5.0 ± 18 (2s) % 7.2 8.7 17.9 10.3 11.4 10.2 12.7 6.7 9.1 4.7 6.8 5.1 1.5.6 5.3 4.4 8.2 6.3 6.6 7.5 9.9 7.5 7.3 6.6 7.7 9.3 11.6 11.6 14.9 11.6 14.3 10.2 12.7 6.7 9.1 4.7 6.8 5.1 5.6 5.3 4.4 8.2 6.3 6.6 7.5 9.9 7.5 7.3 6.6 7.7 9.1 1.6 1.6 1.6 1.6 1.6 1.6 1.6 1	110.5           Delta 17           %           155.6           214.2           195.3           174.2           190.1           186.7           188.9           213.5           131.6           157.9           213.5           131.6           157.4           197.6           205.5           184.2           194.3           286.6           216.1           263.5           254.0           81.1           110.4           91.2           60.2           69.8           67.6           67.3           128.7           102.2           132.4           129.0           134.1           137.3           1208.2           121.2           122.6           123.2	a.1         ★17 (2s)         %a         16.3         19.6         39.7         23.3         25.4         30.7         23.3         25.4         30.7         15.4         20.7         10.8         15.6         11.6         12.9         12.1         9.9         12.1         9.9         12.1         9.9         15.0         17.1         16.8         26.3         34.4         27.4         28.5         27.4         28.5         27.4         28.5         27.4         28.5         27.4         28.5         27.4         28.5         27.4         28.5         27.4         28.5         27.4         21.2         22.2         22.2         22.2         22.2         22.2 <tr< td=""></tr<>
FR35 FR35 Hot Spot 3 Hot Spot 10 Hot Spot 10 Hot Spot 10 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 22 Randomm Area 10 Randomm Area 11 Randomm Area 11 Randomm Area 13 Randomm Area 14 Randomm Area 14 Randomm Area 15 Randomm Area 15 Randomm Area 19 Randomm Area 22 Randomm Area 23 Randomm Area 23 Randomm Area 22 Randomm Area 22 Randomm Area 23 Randomm Area 24 Randomm Area 22 Randomm Area 24 Randomm Area 24 Randomm Area 24 Randomm Area 25 Hot Spot 14 Hot Spot 19 Hot Spot 18 Randomm Area 3 Randomm Area 7 Randomm Area 8 Randomm Area 9 Hot Spot 6 Hot Spot 6 Hot Spot 6 Hot Spot 7	Sample Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer On Si Wafer Hot Spot on Si Wafer Hot Spot on Si Wafer On Si Wafer Si Wafer On Si Wafer	160 Tot. 8.71E+06 5.75E+06 1.42E+06 3.35E+06 2.18E+06 9.30E+06 9.30E+06 9.30E+06 9.30E+06 9.30E+06 9.30E+06 9.30E+06 9.30E+06 1.34E+07 1.34E+07 1.34E+07 1.34E+07 1.34E+07 1.34E+07 1.34E+07 1.34E+07 1.34E+07 1.34E+07 1.34E+07 1.34E+07 3.34E+06 7.35E+06 3.34E+06 3.3	106E+03 160 Cps 1.54E+05 1.25E+05 1.24E+05 9.33E+04 8.59E+04 1.38E+05 9.33E+04 3.18E+04 3.18E+04 3.18E+04 3.18E+04 3.18E+04 3.18E+04 3.18E+04 3.18E+04 3.18E+04 3.24E+04 3.24E+04 3.25E+04 3.38E+04 2.35E+04 3.38E+04 2.35E+04 1.34E+05 9.00E+04 1.34E+05 9.00E+05 1.75E+05 1.75E+05 1.75E+05 1.75E+05 1.75E+05 1.75E+05 1.75E+05 1.75E+05 1.75E+05 1.75E+05 1.75E+05 1.75E+05 1.75E+05 1.75E+05 1.75E+05 1.75E+05 1.75E+04 1.38E+05 1.75E+04 1.15E+05 1.75E+04 3.25E+04 1.15E+05 1.75E+04 3.25E+04 1.15E+05 1.75E+04 3.25E+04 1.15E+05 1.75E+04 3.25E+04 1.15E+05 1.75E+04 3.25E+04 1.15E+05 1.75E+04 3.25E+04 1.15E+05 1.75E+04 3.25E+04 1.15E+05 1.75E+04 3.25E+04 1.15E+05 1.75E+04 3.25E+04 1.15E+05 1.75E+04 3.25E+04 1.15E+05 1.75E+04 3.25E+04 1.15E+05 1.75E+04 3.25E+04 3.25E+04 1.15E+05 1.75E+04 3.25E+04 3.25E+04 1.15E+05 1.75E+04 3.25E+04 1.16E+05 1.75E+04 3.25E+04 1.40E+04 3.15E+05 1.75E+04 3.25E+04 1.40E+04 3.15E+05 1.75E+04 3.25E+04 1.40E+04 3.15E+05 1.75E+04 3.25E+05 3.25E+04 3.25E+0	170 Tot. 3.74E+03 2.59E+03 6.33E+02 1.54E+03 9.78E+02 1.54E+03 9.78E+02 1.54E+03 9.78E+02 1.22E+03 4.20E+03 4.23E+03 4.23E+03 6.00E+03 5.34E+03 3.53E+03 3.54E+	170 Cps 6.59E+01 5.64E+01 7.47E+01 5.38E+01 4.30E+01 5.38E+01 4.30E+01 5.38E+01 1.31E+01 2.32E+01 1.31E+01 2.32E+01 1.31E+01 2.36E+01 1.32E+01 1.45E+01 1.15E+01 1.15E+01 1.15E+01 1.15E+01 1.15E+01 1.54E+01 4.26E+01 3.65	180 Tot. 1.91E+04 1.31E+03 3.14E+03 9.45E+03 4.92E+03 9.54E+03 6.25E+03 2.02E+04 1.20E+04 1.20E+04 2.47E+04 2.36E+04 3.36E+04 3.61E+04 3.61E+04 3.61E+04 2.32E+04 1.39E+04 1.39E+04 1.39E+04 1.39E+04 1.39E+04 1.59E+04 3.30E+03 3.24E+04 1.59E+04 1.52E+03 1.52E+04 1.52E+	180 Cps 3.36E+02 2.89E+02 3.70E+02 2.73E+02 2.73E+02 2.73E+02 2.73E+02 1.94E+02 1.94E+02 7.38E+01 7.03E+01 1.42E+02 6.87E+01 1.42E+02 6.87E+01 1.22E+02 1.06E+02 1.05E+01 1.05E+01 1.05E+01 1.05E+01 1.05E+02 1.05E+02 1.05E+02 1.05E+02 1.05E+02 1.05E+02 1.05E+02 1.05E+02 1.05E+02 1.05E+02 1.05E+02 1.05E+02 1.05E+02 1.05E+02 1.05E+01 1.05E+01 1.05E+01 1.05E+01 1.05E+01 1.05E+01 1.05E+01 1.05E+01 1.05E+01 1.05E+01 1.05E+01 1.05E+01 1.05E+01 1.05E+01 1.05E+01 1.05E+02 2.04E+00 2.54E+01 1.05E+02 2.04E+00 2.54E+01 1.05E+02 2.04E+00 2.54E+01 1.05E+02 2.04E+00 2.54E+01 1.05E+02 2.04E+00 2.54E+01 1.05E+02 2.04E+00 2.54E+01 1.05E+02 2.04E+00 2.54E+01 1.05E+02 2.04E+00 2.54E+01 1.05E+02 2.04E+00 2.54E+01 1.05E+02 2.04E+00 2.54E+01 1.05E+02 2.04E+00 2.54E+01 1.05E+02 2.04E+00 2.54E+01 1.05E+02 2.04E+00 2.54E+01 1.05E+02 2.04E+00 2.04E+0	0.1           Detta 18           27.4           85.1           34.1           41.7           85.4           43.9           51.1           89.4           64.1           79.2           57.3           91.2           37.2           51.2           31.7           127.9           105.3           84.6           67.7           105.8           124.5           121.1           9.4           -5.6           27.7           59.6           3.3           19.9           3.3           19.9           3.3           19.9           59.6           27.7           59.1           3.3           19.9           41.3           35.7           36.2           42.6           16.7           36.2           42.6           18.3           15.7           36.2 <tr td=""></tr>	3.0 ± 18 (2s) % 7.2 8.7 17.9 10.3 11.4 14.3 10.2 12.7 6.7 9.1 4.7 6.8 5.1 5.6 5.3 4.4 8.2 6.3 6.0 6.5 7.5 9.9 7.5 7.3 6.6 7.7 9.3 11.6 14.9 11.6 14.9 11.6 14.9 11.6 14.9 11.6 14.9 11.6 14.9 11.6 14.9 11.6 14.3 6.2 5.4 4.9 11.6 14.3 6.2 5.4 4.9 11.6 14.3 6.2 5.4 4.9 11.6 14.3 6.2 5.4 1.5 6.7 7.5 7.5 7.5 7.5 7.5 7.5 7.5 7	110.5           Delta 17           %           155.6           214.2           195.8           168.1           239.0           195.3           174.2           190.1           186.7           188.9           157.9           213.5           131.6           157.4           197.5           184.2           194.3           286.6           216.1           266.2           254.0           81.1           110.2           69.8           67.6           87.3           128.1           117.2           132.6           129.0           134.1           137.3           128.1           117.2           132.0           134.1           137.3           129.4	a.1         ★17 (2s)         %         16.3         19.6         3.3         25.4         20.9         28.7         15.4         20.7         15.4         20.7         15.4         20.9         18.16         12.9         19.1         14.4         13.7         14.8         16.6         22.9         17.1         16.6         22.9         17.1         16.6         22.9         17.1         16.2         29.9         17.1         16.6         22.9         17.0         21.2         26.3         34.4         27.4         41.1         12.2         25.6         14.3         12.2         25.6         14.3         12.2         25.6         22.2         20.6         20.6
FR35 FR35 Hot Spot 3 Hot Spot 10 Hot Spot 10 Hot Spot 10 Hot Spot 13 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 22 Randomm Area 10 Randomm Area 11 Randomm Area 13 Randomm Area 13 Randomm Area 13 Randomm Area 13 Randomm Area 15 Randomm Area 18 Randomm Area 19 Randomm Area 20 Randomm Area 20 Randomm Area 21 Randomm Area 20 Randomm Area 20 Randomm Area 21 Randomm Area 20 Randomm Area 21 Randomm Area 21 Randomm Area 18 Randomm Area 20 Randomm Area 21 Randomm Area 20 Randomm Area 20 Randomm Area 21 Randomm Area 20 Randomm Area 21 Randomm Area 3 Randomm Area 3 Randomm Area 3 Randomm Area 7 Randomm Area 7 Random A	Sample Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer On Si Wafer Si Wafer	160 Tot. 8.71E+06 5.75E+06 1.42E+06 4.26E+06 4.26E+06 4.26E+06 4.26E+06 9.50E+06 5.28E+06 9.50E+06 9.50E+06 9.50E+06 1.52E+07 1.34E+07 1.34E+07 1.34E+07 1.34E+07 1.34E+07 1.34E+07 1.34E+07 1.34E+07 1.34E+06 4.20E+06 4.20E+06 4.20E+06 3.35E+06 3.35E+06 3.35E+06 3.35E+06 3.35E+06 3.35E+06 3.35E+06 3.35E+06 3.35E+06 3.35E+06 3.35E+06 3.35E+06 3.35E+06 3.35E+07 1.56E+07 1.56E+07 1.56E+07 1.56E+07 1.56E+07 1.56E+07 1.56E+07 3.36E+06 3.35E+07 3.35E+07 3.3	160 Cps 1.54E+05 1.25E+05 1.25E+05 1.25E+05 1.24E+05 9.33E+04 1.34E+05 9.33E+04 1.34E+05 9.33E+04 3.318E+04 3.318E+04 3.318E+04 3.318E+04 3.345E+04 3.345E+04 3.345E+04 3.345E+04 3.345E+04 3.345E+04 3.345E+04 1.345E+05 1.35E+05 9.00E+04 1.345E+05 1.37E+05	170 Tot. 3.74E+03 2.59E+03 6.33E+02 1.54E+03 9.78E+02 1.54E+03 9.78E+02 1.54E+03 9.78E+02 1.54E+03 4.22E+03 4.22E+03 4.22E+03 4.32E+03 4.32E+03 4.36E+03 3.41E+03 3.41E+03 3.41E+03 3.42E+03 4.34E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 1.35E+04 1.33E+04 1.23E+03 1.35E+03 1.35E+03 1.34E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 1.35E+03 1.35E+03 1.35E+03 1.52E+03 6.51E+03 7.59E+03 1.52E+03 6.51E+03 7.59E+03 1.52E+03 6.51E+03 7.59E+03 1.52E+03 6.51E+03 7.59E+03 1.52E+03 6.51E+03 7.59E+03 1.52E+03 6.51E+03 7.59E+03 1.52E+03 6.51E+03 7.59E+03 1.52E+03 6.51E+03 1.52E+03 6.51E+03 1.52E+	170 Cps 6.59E+01 5.64E+01 7.47E+01 5.38E+01 4.30E+01 3.38E+01 1.32E+01 2.32E+01 1.31E+01 2.32E+01 1.31E+01 2.36E+01 1.31E+01 2.36E+01 1.32E+01 1.32E+01 1.35E+01 1.35E+01 1.31E+01 2.36E+01 3.36E+01 3.36E+01 3.36E+01 3.36E+01 3.36E+01 2.36E+01 3.36E+01 2.36E+01 3.36E+01 2.36E+01 2.36E+01 3.36E+01 2.36E+01 2.36E+01 3.36E+01 2.36E+01 2.36E+01 3.36E+01 2.36E+01 2.36E+01 3.36E+01 2.36	180           180           Tot.           1.91E+04           1.32E+04           3.14E+03           9.35E+03           9.45E+03           9.54E+03           9.54E+03           9.54E+03           9.54E+03           9.54E+03           9.54E+04           2.0E+04           1.0E+04           3.316E+04           3.316E+04           2.52E+04           2.38E+04           1.79E+04           1.3E+04           1.69E+04           1.3E+04           1.69E+04           1.3E+04           1.69E+04           1.3E+04           1.69E+04           1.3E+04           1.69E+04           1.3E+04           4.52E+03           3.30E+03           9.38E+03           3.2E+04           4.18E+04           3.52E+04           8.32E+03           1.25E+04           6.72E+03	180 Cps 3.36E+02 2.89E+02 3.70E+02 2.75E+02 2.75E+02 2.75E+02 2.75E+02 2.75E+02 2.75E+02 2.75E+02 1.94E+02 7.38E+01 1.22E+02 6.87E+01 1.22E+02 4.68E+01 8.90E+01 7.35E+01 3.27E+01 3.27E+01 3.27E+01 3.27E+01 3.27E+01 3.27E+01 3.27E+01 3.27E+01 3.27E+01 3.27E+01 3.27E+01 3.27E+01 3.27E+01 3.27E+01 3.27E+01 3.27E+01 3.28E+02 2.29E+01 1.95E+02 3.06E+02 2.29E+01 1.55E+02 2.34E+02 2.34E+02 2.34E+02 2.34E+02 2.34E+02 2.34E+02 2.34E+02 2.34E+02 2.34E+02 2.34E+02 2.34E+02 2.34E+02 2.34E+02 2.34E+02 2.34E+02 2.34E+02 2.34E+02 2.34E+02 2.34E+02 2.54E+01 1.55E+01 1.55E+01 1.55E+01 1.55E+01 1.55E+01 1.55E+01 1.55E+01 1.55E+01 1.55E+01 1.55E+02 2.34E+02 2.34E+02 2.34E+02 2.54E+01 1.55E+0	0.1 Delta 18 % 27.4 85.1 34.1 34.1 34.1 34.1 34.1 34.1 34.1 34.1 34.1 34.1 34.1 34.1 34.1 34.1 34.1 34.1 34.1 37.2 37.7 37.2	5.0 ± 18 (2s) % 7.2 8.7 17.9 10.3 11.4 14.3 10.2 12.7 6.7 9.1 4.7 6.8 5.1 5.6 5.3 4.4 8.2 6.3 6.0 6.5 9.9 7.5 7.3 6.6 7.9 9.1 4.7 6.7 9.1 4.7 6.8 5.1 5.6 5.3 11.6 14.9 11.6 14.9 11.8 12.4 11.7 11.6 14.3 6.8 11.6 14.9 11.8 12.4 11.7 11.6 14.3 6.8 11.6 14.9 11.8 12.4 11.7 11.6 14.3 6.8 11.6 14.9 11.8 12.4 11.7 11.6 14.3 11.6 14.3 11.6 14.3 11.6 14.9 11.8 12.4 11.7 11.6 14.3 6.8 11.6 14.9 11.8 12.4 11.7 11.6 14.3 6.8 13.5 14.9 11.6 14.3 6.8 11.6 14.9 11.8 12.4 11.7 11.6 14.3 6.8 15.6 5.3 11.6 14.9 11.8 12.4 11.6 14.3 6.8 15.3 11.6 14.9 11.8 12.4 11.7 11.6 14.9 11.8 12.4 11.7 11.6 14.9 11.8 12.4 11.7 11.6 14.9 11.8 12.4 11.7 11.6 14.9 11.8 12.4 11.7 11.6 14.9 11.8 12.4 11.7 11.6 14.9 11.8 12.4 11.7 11.6 14.9 11.8 12.4 11.7 11.6 14.3 6.8 11.0 8.9 11.0 8.9 11.0 8.9 11.0 8.9 11.0 8.9 11.0 8.9 11.0 8.9 11.0 8.9 11.0 8.9 12.2 12.2 12.2 12.2 12.2 13.0 14.9 12.2 12.2 12.2 13.0 14.9 14.3 14.9 14.9 14.3 14.9 14.3 14.9 14.3 14.9 14.3 14.9 14.3 14.9 14.3 14.9 14.3 14.9 14.	110.5           Delta 17           %           155.6           214.2           195.3           174.2           190.1           186.7           188.9           157.9           213.5           131.6           129.5           131.6           216.1           266.2           199.9           232.5           254.0           81.1           110.4           91.2           60.8           67.6           87.3           128.6           129.9           232.5           254.0           81.1           110.4           91.2           60.8           67.6           87.3           128.4           117.2           102.4           132.6           129.4           136.3	a.1         ★17 (2s)         %         16.3         19.6         39.7         23.3         25.4         20.0         22.9         28.7         15.4         20.7         15.4         20.7         15.4         20.9         12.9         12.1         9.9         19.1         14.4         13.7         14.8         6.6         12.9         17.1         18.6         12.9         17.1         18.6         12.9         17.1         18.6         19.9         19.1         14.4         16.9         15.0         17.0         17.2         26.3         24.4         27.4         41.3         15.7         33.15.7         33.15.7         33.12.4         21.2         25.6         12.2
FR35 FR35 Hot Spot 3 Hot Spot 10 Hot Spot 10 Hot Spot 13 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 22 Randomm Area 10 Randomm Area 11 Randomm Area 13 Randomm Area 13 Randomm Area 16 Randomm Area 17 Randomm Area 17 Randomm Area 18 Randomm Area 23 Randomm Area 21 Randomm Area 21 Randomm Area 23 Randomm Area 24 Hot Spot 12 Hot Spot 13 Randomm Area 3 Randomm Area 3 Randomm Area 3 Randomm Area 3 Randomm Area 7 Randomm Area 7	Sample Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer On Si Wafe	160 Tot. 8.71E+06 5.75E+06 1.42E+06 3.35E+06 2.79E+06 4.29E+06 4.29E+06 4.29E+06 4.29E+06 4.29E+06 4.29E+06 5.28E+06 1.65E+07 1.43E+07 1.43E+07 1.43E+07 1.43E+07 1.43E+07 1.43E+07 1.43E+07 1.43E+07 1.43E+07 1.43E+07 1.43E+07 1.52E+06 3.35E+06 3.35E+06 3.35E+06 3.35E+06 3.35E+06 3.35E+06 3.35E+06 3.35E+06 3.35E+06 3.35E+06 3.35E+06 3.35E+07 1.66E+07 1.55E+07 1.56E+07 3.55E+07 1.56E+07 3.55E+07 1.56E+07 3.55E+07 1.56E+07 3.55E+07 1.56E+07 3.55E+07 1.56E+07 3.55E+07 1.55E+07 1.56E+07 3.55E+07 1.56E+07 3.55E+07 1.5	160 Cps 1.54E+05 1.25E+05 1.25E+05 1.32E+05 1.32E+04 1.32E+04 1.32E+04 3.38E+04 3.38E+04 3.38E+04 3.38E+04 3.38E+04 3.38E+04 3.38E+04 3.38E+04 3.38E+04 3.38E+04 3.38E+04 3.38E+04 3.38E+04 1.34E+04 3.38E+04 1.34E+04 3.38E+04 1.34E+04 3.36E+04 1.38E+05 1.15E+05 1.35E+05 1.35E+04 1.38E+05 1.35E+04 3.38	170 Tot. 3.74E+03 2.59E+03 6.33E+02 1.54E+03 9.78E+02 1.54E+03 9.78E+02 1.54E+03 9.78E+02 1.22E+03 1.22E+03 4.20E+03 4.20E+03 4.20E+03 6.00E+03 3.41E+03 3.63E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.44E+03 3.50E+03 1.33E+03 3.44E+03 3.50E+03 1.33E+03 3.44E+03 3.50E+03 1.33E+03 3.50E+03 1.52E+03 6.75E+03 1.52E+03 2.52E+03 1.52E+03 2.55E+03 1.52E+03 1.52E+03 2.55E+03 1.52E+03 2.55E+03 1.52E+03 2.55E+03 1.52E+03 2.55E+	170 Cps 6.59E+01 5.64E+01 7.47E+01 5.38E+01 4.30E+01 3.385E+01 2.32E+01 1.31E+01 2.32E+01 1.31E+01 2.32E+01 1.31E+01 2.32E+01 1.31E+01 2.32E+01 1.31E+01 2.32E+01 1.45E+01 1.32E+01 1.45E+01 1.45E+01 1.45E+01 1.45E+01 1.45E+01 3.65E+01 4.26E+01 3.65E+01 2.35E+01 2.35E+01 2.55E+01 2.55E+01 3.5	180 Tot. 1.91E+04 1.31E+04 3.14E+03 3.14E+03 9.45E+03 9.45E+03 9.45E+03 9.45E+03 0.52H+04 2.20E+04 2.20E+04 2.20E+04 2.31E+04 2.47E+04 2.31E+04 1.31E+04 1.31E+04 1.31E+04 1.32E+04 1.32E+04 1.38E+04 1.35E+04 1.52E+04 3.32E+	180 Cps 3.36E+02 2.89E+02 3.70E+02 2.95E+02 3.70E+02 2.95E+02 3.70E+02 2.95E+02 3.70E+02 1.94E+02 3.09E+02 1.19E+02 6.87E+01 1.42E+02 4.68E+01 1.42E+02 4.68E+01 7.45E+01 5.68E+01 7.45E+01 5.68E+01 7.35E+01 5.68E+01 7.35E+01 5.68E+01 1.95E+02 2.98E+01 1.95E+02 2.34E+0	0.1 Delta 18 % 27.4 85.1 34.1 41.7 85.4 35.1 43.9 51.1 89.4 64.1 27.3 91.2 57.3 91.0 5.3 84.6 67.7 105.8 84.6 67.7 105.8 84.5 109.4 109.5 109.4 109.5 109.4 109.7 105.5 109.4 109.4 109.4 109.4 109.5 109.4 109.5 109.4 109.5 109.4 109.5 109.4 109.5 109.5 109.4 109.5 109.4 109.5 109.5 109.4 109.5	5.0 ± 18 (2s) % 7.2 8.7 17.9 10.3 11.4 10.2 12.7 6.7 9.1 4.7 6.7 9.1 4.7 6.8 5.1 5.6 5.3 4.7 6.3 6.0 6.5 7.5 9.9 7.5 7.3 6.6 7.7 9.3 11.6 8.2 6.3 6.0 6.5 7.5 9.9 7.5 7.3 6.6 7.7 9.3 11.6 8.1 11.8 12.7 1.4 1.4 1.4 1.4 1.5 6.3 6.0 6.5 7.5 9.9 7.5 6.7 9.3 11.6 8.8 1.1 1.4 1.4 1.4 1.5 6.3 6.0 6.5 7.5 9.9 7.5 6.8 1.1 6.8 1.1 6.6 7.5 9.9 7.5 6.8 1.1 6.6 7.7 9.3 1.1 6.8 1.1 6.2 5.4 9.9 1.1 6.2 5.4 9.9 1.1 6.8 1.1 6.8 1.1 6.8 1.1 6.2 5.4 9.9 1.1 6.2 5.4 9.9 1.1 6.8 1.1 6.8 1.1 6.2 5.4 9.9 1.1 6.2 5.4 9.9 1.1 6.8 1.1 6.2 5.4 9.9 1.1 6.2 5.4 9.9 1.1 6.8 1.1 6.2 5.4 9.9 1.1 6.2 5.4 9.9 1.1 6.2 5.4 9.9 1.1 6.2 5.4 9.9 1.1 6.2 5.4 9.9 1.1 6.2 5.4 9.9 1.1 6.2 5.4 9.9 1.1 6.2 5.4 9.9 1.2 5.1 1.0 8.9 9.1 1.2 5.1 1.0 8.9 1.2 5.1 1.0 8.9 1.2 5.1 5.1 5.4 5.4 9.9 7.7 7.7 7.7 7.7 7.7 7.7 7.7	110.5           Delta 17           %           155.6           214.2           195.3           174.2           190.1           186.7           188.9           157.9           213.5           131.6           197.6           205.9           132.6           168.1           232.5           254.0           216.1           263.5           194.3           286.6           199.9           232.5           254.0           261.1           100.4           260.2           69.8           81.1           110.2           60.2           69.8           123.2.6           123.2.6           129.0           134.1           137.3           120.8           118.0           129.4           136.3           131.3	s.1         ★17 (2s)         %         16.3         19.6         39.7         23.3         25.4         30.7         23.3         25.4         30.7         28.7         15.4         20.7         15.4         20.7         15.4         20.7         15.4         20.7         15.4         20.7         15.4         20.7         11.6         22.9         17.1         14.8         16.6         12.9         15.0         17.0         15.0         17.1         16.9         15.0         17.2         26.3         34.4         11.2         27.4         41.1         23.3         15.7         34.3         12.4         11.2         25.6         12.2         26.6         28.2      <
FR35 FR35 Hot Spot 3 Hot Spot 10 Hot Spot 10 Hot Spot 11 Hot Spot 13 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 15 Hot Spot 22 Randomm Area 10 Randomm Area 10 Randomm Area 11 Randomm Area 13 Randomm Area 13 Randomm Area 13 Randomm Area 16 Randomm Area 16 Randomm Area 17 Randomm Area 18 Randomm Area 23 Randomm Area 21 Randomm Area 21 Randomm Area 23 Randomm Area 21 Randomm Area 21 Randomm Area 23 Randomm Area 21 Randomm Area 3 Randomm Area 3 Randomm Area 3 Randomm Area 4 Hot Spot 7 Hot Spot 20 Randomm Area 4 Hot Spot 20 Random Area 4 Hot Spot 20 Randomm Area 4 Hot Spot 20 Random	Sample           Robert-Juillet-2020_18.im	Comments Hot Spot on Si Wafer Hot Spot on Si Wafer On Si Wafer Hot Spot on Si Wafer Hot Spot on Si Wafer Hot Spot on Si Wafer Hot Spot on Si Wafer On Si Wafer	160 Tot. 8.71E+06 5.75E+06 1.42E+06 3.35E+06 4.29E+06 2.79E+06 4.29E+06 2.79E+06 9.50E+06 4.29E+06 2.79E+06 9.50E+06 9.50E+06 9.50E+06 1.43E+07 1.43E+06 3.31E+06 3.31E+06 3.31E+06 3.31E+06 3.31E+06 1.46E+07 1.55E+07 1.5	160 Cps 1.54E+05 1.54E+05 1.25E+05 1.25E+05 1.32E+05 1.32E+04 1.39E+04 3.08E+04 4.38E+04 3.08E+04 3.08E+04 4.38E+05 1.14E+04 4.31E+04 4.32E+04 4.32E+04 4.32E+04 4.38E+05 1.14E+04 5.12E+05 1.16E+05 7.65E+04 1.08E+05 7.65E+04 1.08E+05 7.65E+04 1.08E+05 7.65E+04 1.08E+05 7.65E+04 1.08E+05 7.65E+04 1.08E+05 7.65E+04 1.08E+05 7.65E+04 1.08E+05 7.65E+04 1.08E+05 7.65E+04 1.08E+05 7.65E+04 1.08E+05 7.65E+04 1.08E+05 7.65E+04 1.08E+05 7.65E+04 1.08E+05 7.65E+04 1.08E+05 7.65E+04 1.08E+05 7.55E+04 1.12E+04 5.12E+0	170 Tot. 3.74E+03 2.99E+03 6.33E+02 1.54E+03 9.78E+02 1.91E+03 1.22E+03 4.20E+03 2.33E+03 8.59E+03 2.33E+03 6.09E+03 1.03E+04 4.38E+03 3.64E+03 3.64E+03 3.64E+03 3.64E+03 3.64E+03 3.64E+03 3.64E+03 3.64E+03 3.64E+03 3.64E+03 3.64E+03 3.64E+03 3.64E+03 3.64E+03 3.64E+03 3.65E+03 3.65E+03 1.52E+	170 Cps 6.59E+01 5.64E+01 7.47E+01 5.38E+01 4.30E+01 3.385E+01 6.18E+01 2.32E+01 1.37E+01 2.32E+01 1.31E+01 2.36E+01 1.31E+01 2.36E+01 1.31E+01 2.36E+01 1.31E+01 1.51E+01 1.41E+01 1.52E+01 4.45E+01 1.55E+01 3.6	180 Tot. 1.91E+04 1.31E+04 3.14E+03 3.14E+03 9.45E+03 9.45E+03 9.45E+03 9.45E+03 9.45E+03 9.45E+03 2.20E+04 1.42E+04 3.16E+04 3.16E+04 3.16E+04 3.16E+04 3.16E+04 1.47E+04 2.52E+04 1.47E+04 1.52E+04 1.52E+04 1.52E+04 1.58E+04 1.58E+04 3.30E+03 3.30E+03 3.32E+04 4.52E+03 3.32E+04 4.52E+03 3.32E+04 4.52E+03 3.32E+04 4.52E+04 3.32E+04 4.52E+04 3.32E+04 4.52E+04 3.32E+04 4.52E+04 3.32E+04 4.52E+04 3.52E+04 3.52E+04 4.52E+04 3.52E+04 4.52E+04 3.52E+04 4.52E+04 4.52E+04 3.52E+04 4.52E+04 4.52E+04 3.52E+04 4.52E+04 4.52E+04 3.52E+04 3.52E+	180 Cps 3.36E+02 2.89E+02 3.70E+02 2.75E+02 2.16E+02 1.94E+02 3.09E+02 3.09E+02 3.09E+02 1.19E+02 3.09E+02 1.19E+02 6.87E+01 1.22E+02 1.100E+02 6.87E+01 1.42E+02 6.87E+01 1.42E+02 1.15E+02 1.66E+02 2.46E+01 5.68E+01 5.56E+01 5.56E+01 5.56E+01 1.56E+02 2.46E+02 2.34E+01 1.56E+02 2.34E+01 1.56E+01 8.19E+01 1.56E+01 8.19E+02 2.34E+01 1.56E+01 8.19E+01 1.56E+01 8.19E+01 1.56E+01 8.19E+02 2.34E+01 1.56E+01 2.25E+02 2.34E+01 1.56E+01 2.25E+02 2.34E+01 1.56E+01 2.54E+01 1.22E+02 2.34E+02 2.34E+01 1.22E+02 2.34E+	0.1           Delta 18           %           27.4           85.1           34.1           34.1           34.1           35.1           89.4           64.1           79.2           51.2           37.2           51.2           31.7           127.9           105.3           84.6           67.7           105.3           84.6           67.7           105.3           84.6           67.7           105.3           84.6           67.7           105.3           121.1           70.9           9.5           124.1           70.9           9.5           19.4           -5.9           -5.9           -5.9           -5.9           -5.0           13.3           15.7           36.2           10.3           10.5           10.5           10.5           10.5 <td>5.0 ± 18 (2s) % 7.2 8.7 17.9 10.3 11.4 10.2 12.7 6.7 9.1 4.7 6.7 9.1 4.7 6.8 5.1 5.6 5.3 4.4 8.2 6.3 6.6 7.5 9.9 7.5 7.3 6.6 7.7 9.9 11.6 14.9 11.7 11.7 11.6 11.6 14.9 11.7 11.7 11.6 11.6 11.6 14.9 11.7 11.7 11.6 11.7 11.6 11.6 11.7 11.6 11.7 11.6 11.7 11.6 11.7 11.6 11.7 11.7 11.6 11.7 11.7 11.6 11.7 11.7 11.6 11.7 11.7 11.6 11.7 11.6 11.7 11.7 11.6 11.7 11.7 11.6 11.7 11.7 11.6 11.7 11.7 11.7 11.6 11.7 11.</td> <td>110.5           Delta 17           %s           155.6           214.2           195.8           168.1           239.9           195.3           174.2           195.3           174.2           190.1           186.7           188.9           213.5           129.5           131.6           157.9           213.6           157.9           213.6           157.9           213.6           157.9           213.6           157.9           213.6           157.9           232.5           254.0           110.4           91.2           60.2           67.6           87.3           128.4           137.3           120.8           118.7           120.8           131.3           132.5           131.3           135.2</td> <td>a.1         ★17 (2s)         %         16.3         19.6         39.7         23.3         25.4         30.7         23.3         25.4         30.7         15.4         20.7         15.4         20.7         15.4         20.7         15.4         20.7         15.4         20.7         15.4         20.7         15.4         20.7         15.4         20.7         15.4         20.7         15.4         20.7         15.4         20.7         19.9         19.1         14.4         22.9         15.0         17.1         16.5         17.2         26.3         34.4         10.7         33.5         11.1         23.5         14.3         15.7         33.5         14.1      &lt;</td>	5.0 ± 18 (2s) % 7.2 8.7 17.9 10.3 11.4 10.2 12.7 6.7 9.1 4.7 6.7 9.1 4.7 6.8 5.1 5.6 5.3 4.4 8.2 6.3 6.6 7.5 9.9 7.5 7.3 6.6 7.7 9.9 11.6 14.9 11.7 11.7 11.6 11.6 14.9 11.7 11.7 11.6 11.6 11.6 14.9 11.7 11.7 11.6 11.7 11.6 11.6 11.7 11.6 11.7 11.6 11.7 11.6 11.7 11.6 11.7 11.7 11.6 11.7 11.7 11.6 11.7 11.7 11.6 11.7 11.7 11.6 11.7 11.6 11.7 11.7 11.6 11.7 11.7 11.6 11.7 11.7 11.6 11.7 11.7 11.7 11.6 11.7 11.	110.5           Delta 17           %s           155.6           214.2           195.8           168.1           239.9           195.3           174.2           195.3           174.2           190.1           186.7           188.9           213.5           129.5           131.6           157.9           213.6           157.9           213.6           157.9           213.6           157.9           213.6           157.9           213.6           157.9           232.5           254.0           110.4           91.2           60.2           67.6           87.3           128.4           137.3           120.8           118.7           120.8           131.3           132.5           131.3           135.2	a.1         ★17 (2s)         %         16.3         19.6         39.7         23.3         25.4         30.7         23.3         25.4         30.7         15.4         20.7         15.4         20.7         15.4         20.7         15.4         20.7         15.4         20.7         15.4         20.7         15.4         20.7         15.4         20.7         15.4         20.7         15.4         20.7         15.4         20.7         19.9         19.1         14.4         22.9         15.0         17.1         16.5         17.2         26.3         34.4         10.7         33.5         11.1         23.5         14.3         15.7         33.5         14.1      <

<u>Table S3.5</u>: Oxygen isotopic composition expressed as  $\delta^{17}O(\infty)$  and  $\delta^{18}O(\infty)$ . The plasma discharge is generated in a mixture MgCl<sub>2</sub> - Pentanol - CO<sub>2</sub>. The sample is collected on a silicon wafer. The ionic counting rates are expressed in counts per second (cps) while the total number of counts (Tot.) depends on the duration of the measurement. The ionic ratios  ${}^{17}O/{}^{16}O$  and  ${}^{18}O/{}^{16}O$  of the PDCM used to calculate the  $\delta$  values are indicated as *Reference Std values*. The area of the PDCM is defined on the same wafer where isotopic hotspots were measured. In absence of identifiable hotspots in an ion image, the raster area ( $20 \times 20 \mu m$ ) was divided in 9 *Random Areas. Bulk* is the measured (not calculated) average of these 9 areas. Note that isotopic effects are detectable even in hotspot free areas. This Table was used to construct the Figure 2 of the text. All sample names correspond to files registered in the NanoSims data files.

#### S4. Calculated MIF slopes in a 3 isotope diagram

Several theories have been developed to account for the MIF effect<sup>(6,16, 25-30)</sup>. They were all based on the results obtained on the isotopic composition of ozone for which numerous and precise laboratory parameters are available in the literature. They are centered on the interpretation of the empirical fit (the  $\eta$  factor) discovered experimentally by Janssen<sup>(2)</sup>, which accounts for the isotopic compositions of the different isotopomers of ozone:

#### $\alpha$ = $\alpha_{\rm MDF}$ . $\eta$

The  $\eta$  factor referred here to as the MIF factor (Mass Independent Fractionation factor) illustrates the fact that, for any isotopomer masses, there is a constant shift between the observed fractionation and the expected MDF factors  $\alpha_{MDF}$ 's. The origin of  $\eta$  will be discussed elsewhere. Whatever its origin,  $\eta$  characterizes the reaction rate ratio of complexes having different symmetry such as [<sup>16</sup>O...<sup>17</sup>O]\*/[<sup>16</sup>O...<sup>16</sup>O]\*. Neglecting the MDF (i.e.  $\alpha_{MDF}$ 's=1), and extending this ratio to all possible isotopic reactions for a given chemical element gives the overall mass independent isotopic fractionation factor <sup>*m*-16</sup> $\alpha^{(18)}$ :

$${}^{m-16}\alpha = \frac{1+x(m)[\eta^{-1}-1]}{1+x(16)[\eta^{-1}-1]}$$

m designates 17 or 18 and x(16), x(17) and x(18) stand for the relative abundances of <sup>16</sup>O, <sup>17</sup>O and <sup>18</sup>O (i.e. 99.76 x10<sup>-2</sup>, 380 x10<sup>-6</sup> and 2000 x10<sup>-6</sup> respectively). Note that, in this formalism, the isotopic fractionation factor is not anymore the rate constant ratio, but instead the reaction rate ratio. In the 3 isotope diagram, the slope  $\Delta(\delta^{17}O)/\Delta(\delta^{18}O)$  depends only on the relative abundances of the 3 isotopes with no free parameters.

Taking the example of magnesium isotopes (X(24)=0.7899, x(25)= 0.100, x(26)=0.11), the slope  $\Delta(\delta^{25}Mg)/\Delta(\delta^{26}O)=0.985$ ,  $\forall(\Delta\eta)$ . A detailed theoretical treatment of the MIF effect is proposed in *Chem. Phys.* (in press).

#### S5. Details of the Pentane/N2O analyses.

	delta 18		delta 17			delta 18		delta 17	
	‰	±2s	‰	±2s		‰	±2s	‰	±2s
FR12-8_1	-306	19.7	-294	27.1	FR12-8_3	-151	19.4	-136	25.9
FR12-8_1	-306	19.7	-287	27.0	FR12-8_3	-163	19.5	-127	26.0
FR12-8_1	-298	19.7	-269	26.9	FR12-8_3	-159	19.5	-136	26.0
FR12-8_1	-288	19.7	-274	26.9	FR12-8_3	-160	19.5	-154	26.1
FR12-8_1	-287	19.7	-266	26.8	FR12-8_3	-174	19.5	-150	26.1
FR12-8_1	-286	19.7	-259	26.7	FR12-8_3	-172	19.5	-144	26.1
FR12-8_1	-274	19.6	-252	26.7	FR12-8_3	-173	19.5	-143	26.1
FR12-8_1	-277	19.6	-245	26.6	FR12-8_3	-179	19.5	-156	26.2
FR12-8_1	-268	19.6	-244	26.6	FR12-8_3	-178	19.5	-145	26.1
FR12-8_1	-268	19.6	-243	26.6	FR12-8_3	-177	19.5	-142	26.1
FR12-8_1	-261	19.6	-242	26.6	FR12-8_3	-179	19.5	-162	26.2
FR12-8_1	-267	19.6	-251	26.6	FR12-8_3	-181	19.5	-156	26.2
FR12-8_1	-267	19.6	-249	26.6	FR12-8_3	-181	19.5	-161	26.2
FR12-8_1	-267	19.6	-255	26.7	FR12-8_3	-186	19.5	-157	26.2
FR12-8_1	-272	19.6	-239	26.6	FR12-8_3	-184	19.5	-168	26.3
FR12-8_1	-268	19.6	-243	26.6	FR12-8_3	-188	19.5	-159	26.3
FR12-8_1	-267	19.6	-247	26.6	FR12-8_3	-184	19.5	-158	26.3
FR12-8_1	-264	19.6	-246	26.7	FR12-8_3	-190	19.5	-168	26.3
FR12-8_1	-267	19.6	-247	26.7	FR12-8_3	-189	19.5	-159	26.3
FR12-8_1	-273	19.6	-247	26.7	FR12-8_3	-186	19.5	-172	26.4
FR12-8_2	-143	19.2	-126	25.2	FR12-8_4	-191	19.5	-170	26.1
FR12-8_2	-143	19.2	-120	25.2	FR12-8_4	-195	19.5	-186	26.3
FR12-8_2	-149	19.2	-117	25.2	FR12-8_4	-201	19.5	-192	26.3
FR12-8_2	-148	19.2	-124	25.2	FR12-8_4	-203	19.5	-175	26.3
FR12-8_2	-151	19.3	-126	25.2	FR12-8_4	-209	19.5	-194	26.4
FR12-8_2	-154	19.3	-121	25.2	FR12-8_4	-207	19.5	-191	26.4
FR12-8_2	-154	19.3	-134	25.3	FR12-8_4	-213	19.6	-204	26.5
FR12-8_2	-158	19.3	-132	25.3	FR12-8_4	-213	19.6	-207	26.5
FR12-8_2	-159	19.3	-139	25.3	FR12-8_4	-211	19.6	-194	26.4
FR12-8_2	-159	19.3	-132	25.3	FR12-8_4	-222	19.6	-201	26.5
FR12-8_2	-164	19.3	-148	25.4	FR12-8_4	-218	19.6	-211	26.6
FR12-8_2	-160	19.3	-146	25.4	FR12-8_4	-221	19.6	-218	26.6
FR12-8_2	-160	19.3	-132	25.3	FR12-8_4	-219	19.6	-222	26.7
FR12-8_2	-162	19.3	-134	25.3	FR12-8_4	-226	19.6	-227	26.7
FR12-8_2	-168	19.3	-159	25.4	FR12-8_4	-228	19.6	-224	26.7
FR12-8_2	-167	19.3	-134	25.4	FR12-8_4	-227	19.6	-229	26.7
FR12-8_2	-168	19.3	-143	25.4	FR12-8_4	-231	19.6	-222	26.7
FR12-8_2	-169	19.3	-137	25.4	FR12-8_4	-232	19.6	-220	26.7
FR12-8_2	-170	19.3	-148	25.4	FR12-8_4	-236	19.6	-212	26.7
FR12-8 2	-169	19.3	-141	25.4	FR12-8 4	-240	19.6	-230	26.8

<u>Table S5</u>: Pentanol/N<sub>2</sub>O experiment.  $\delta^{17,18}$ O measured by depth profiling at the location of the isotopic MIF hotspots. No hotspot in ion intensities was observed at the location of the isotopic MIF hotspots. Each step represents a sputtered thickness between 200 and 300 nm. Data are reported in the Figure S5 bellow.



Figure S5: The  $\delta^{17,18}$ O values reported for the samples FR12@8 from 1 to 4 in Table S3.4 are average values of  $\approx$ 80 measurements for each sample. This figure shows the evolution of the  $\delta^{17,18}\text{O}$  values averaged every 4 measurements. The PDCM used as a reference value for  $\delta$  units is shown for comparison (cf. Table S3.3; open dots around 0-0‰). Black dots, open diamonds, grey dots and open triangle stand for FR12@ 8 from 1 to 4, respectively. Error bars (statistic and PDCM reproducibility) are not shown for clarity but never exceed ±19 and ±26 ‰ (2 $\sigma$ ) for  $\delta^{18}$ O and  $\delta^{17}$ O, respectively. The 1:1 line is drawn for reference. Note that the correlation defined by the data do not intercept the reference at 0-0‰. This may be caused by an analytical "matrix effect" but may also reflects a combined MDF and MIF effect.



Figure S6: The  $\delta^{17,18}$ O of individual emissivity hotspot measured in 3 different images: *Robert-Juillet-2020\_4, \_5 and \_9* reported in Table S3.5. Black dots stand for the same *image 9*. The purpose of this plot is to show that the internal variations between hotspots being recorded in the same image, cannot result from bias in the instrumental setups. The dashed line is the reference 1:1 correlation line. The corresponding emissivity hotspots from *image 9* is shown in the Fig. 2b of the text.