Supporting Information

Coupling of Solvent-free synthesis and reactive extrusion of alumina: an ecologically efficient integration for heterogeneous catalysts synthesis

AUTHOR NAMES

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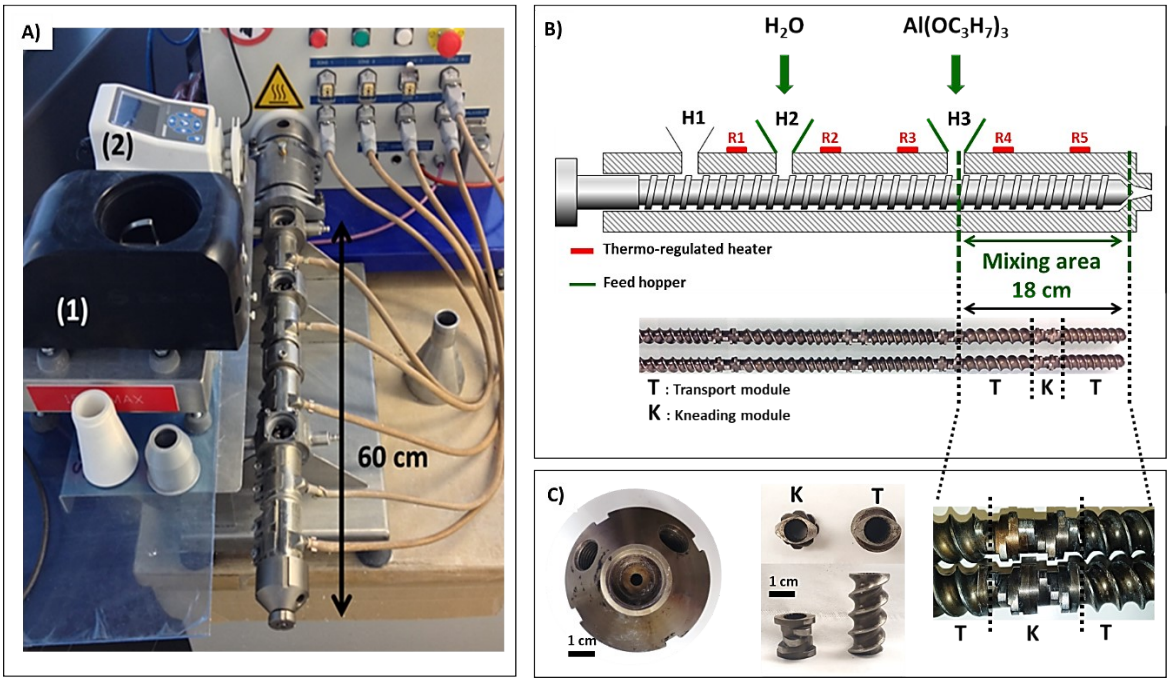
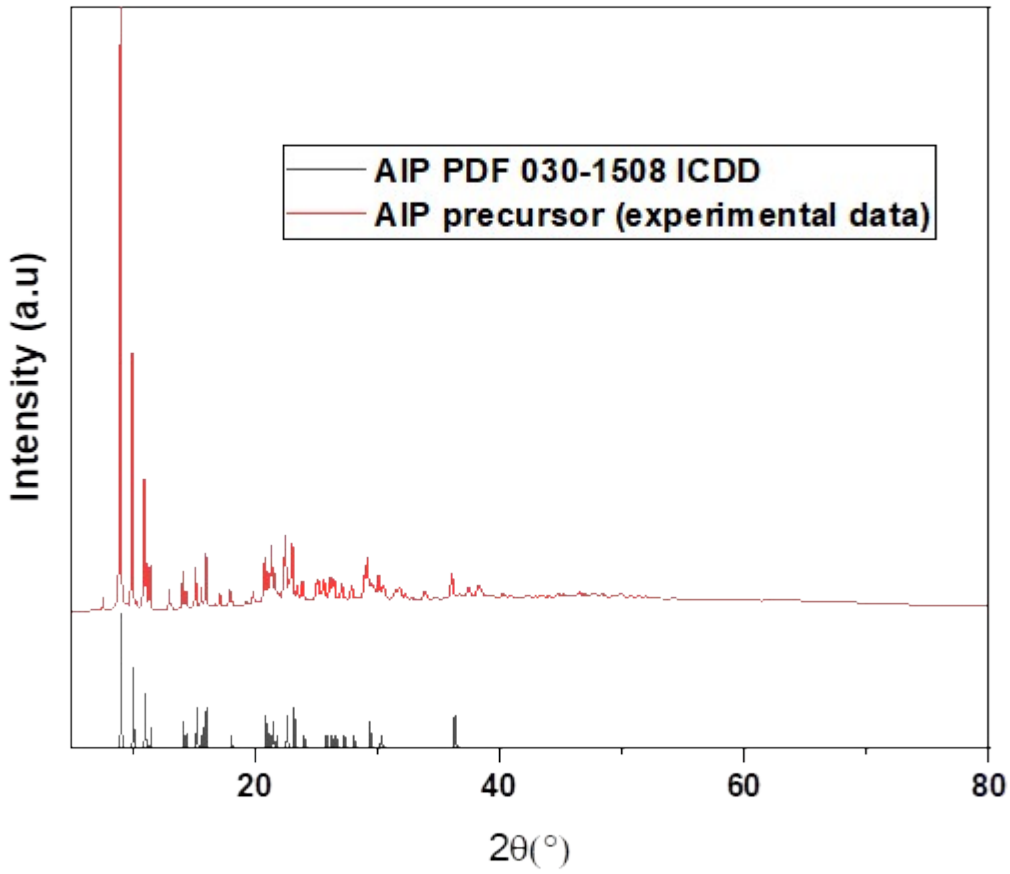
Scamex's Twin Screws Micro-Extruder (TSME)



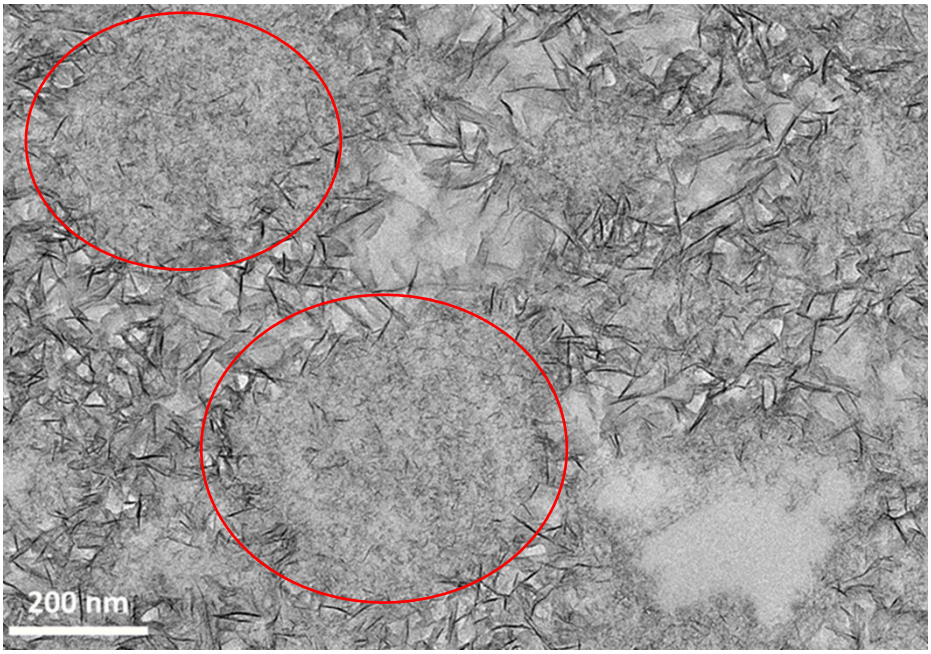
SI. 1. A) TSME picture with the doser (1) and the peristaltic pump (2); B) scheme of the experimental set up associated with the picture of screws design; C) Zoom into the extruder head with 0.5 cm orifice size, in the left, and zoom into screw profil: kneading module 1.8 X 1.8 cm and the transport module 1.8 x 3.5 cm.

Aluminium isopropoxide XRD diffractogram



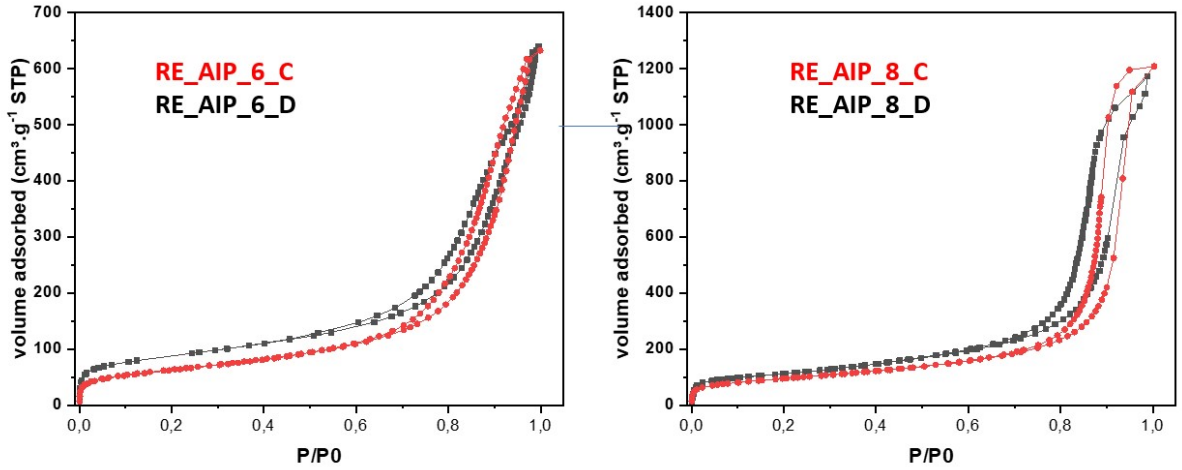
SI. 2. XRD pattern of AIP precursor.

Microtome TEM picture

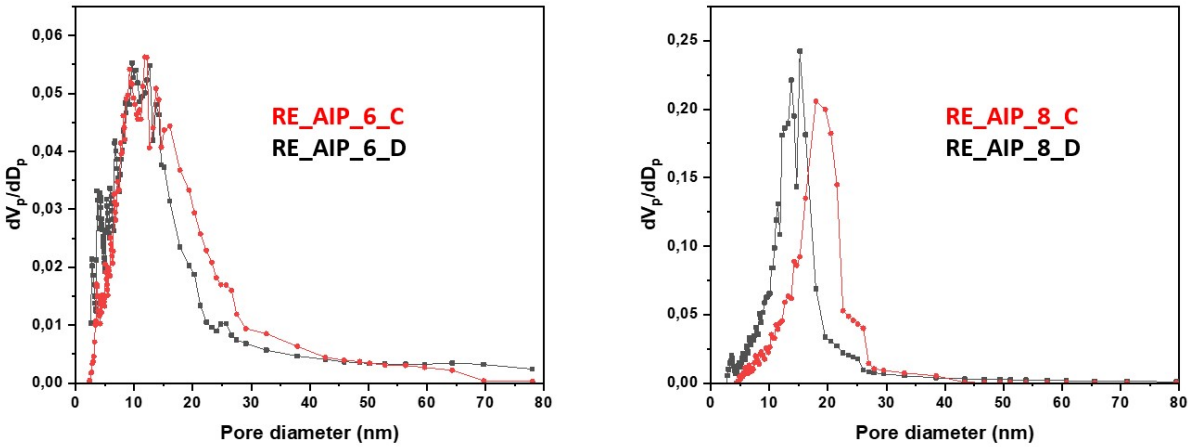


SI. 3. Microtome TEM picture of RE_AIP_8_ D sample, presence of some heterogeneous domains of small platelets.

Nitrogen physisorption isotherms of the extrudates

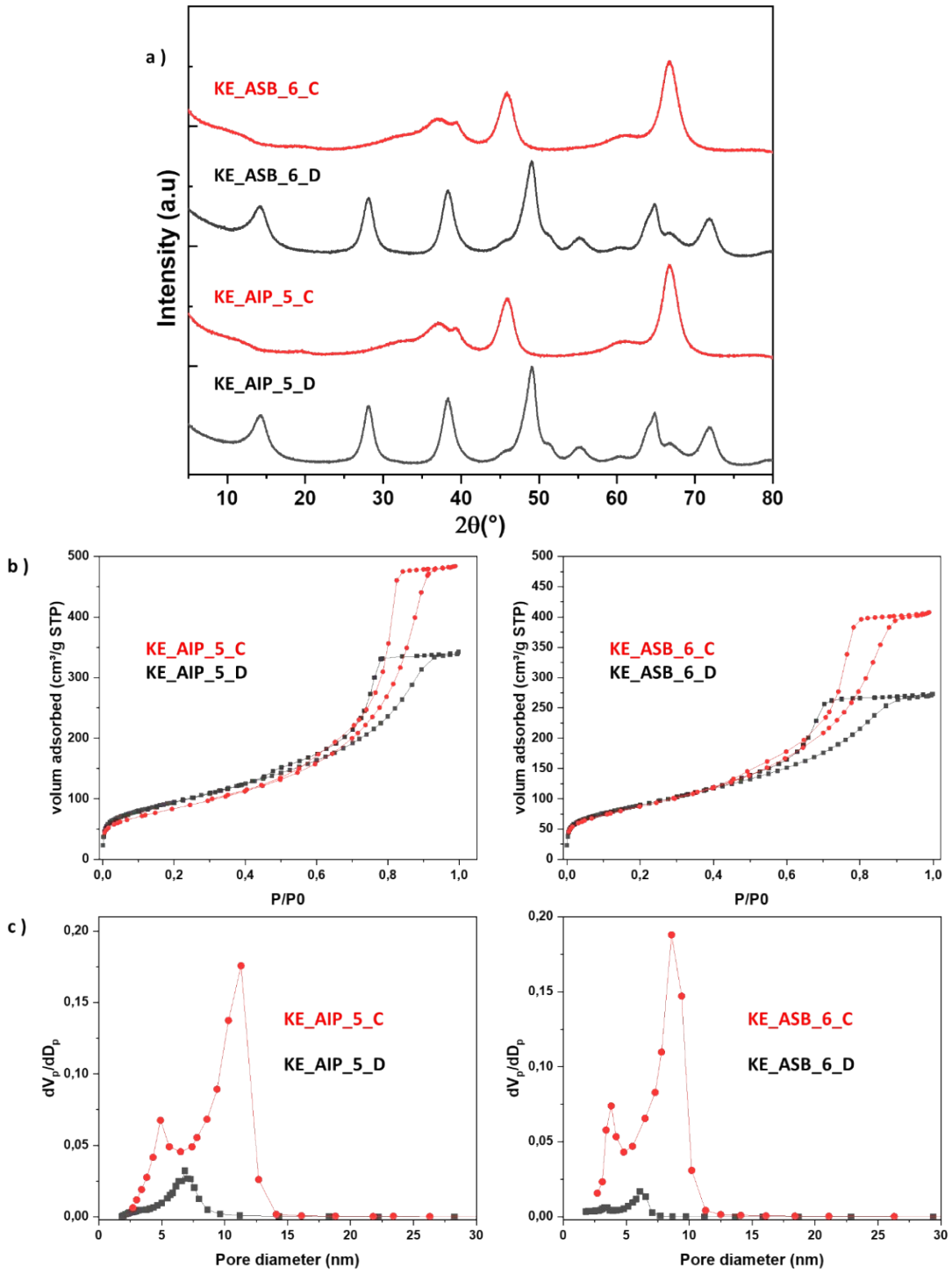


SI. 4. Nitrogen adsorption-desorption isotherms, recorded at 77 K, for samples with hydrolysis rate h= and h=8. The dried extrudates are represented in black and extrudates calcined at 540 °C are represented in red.



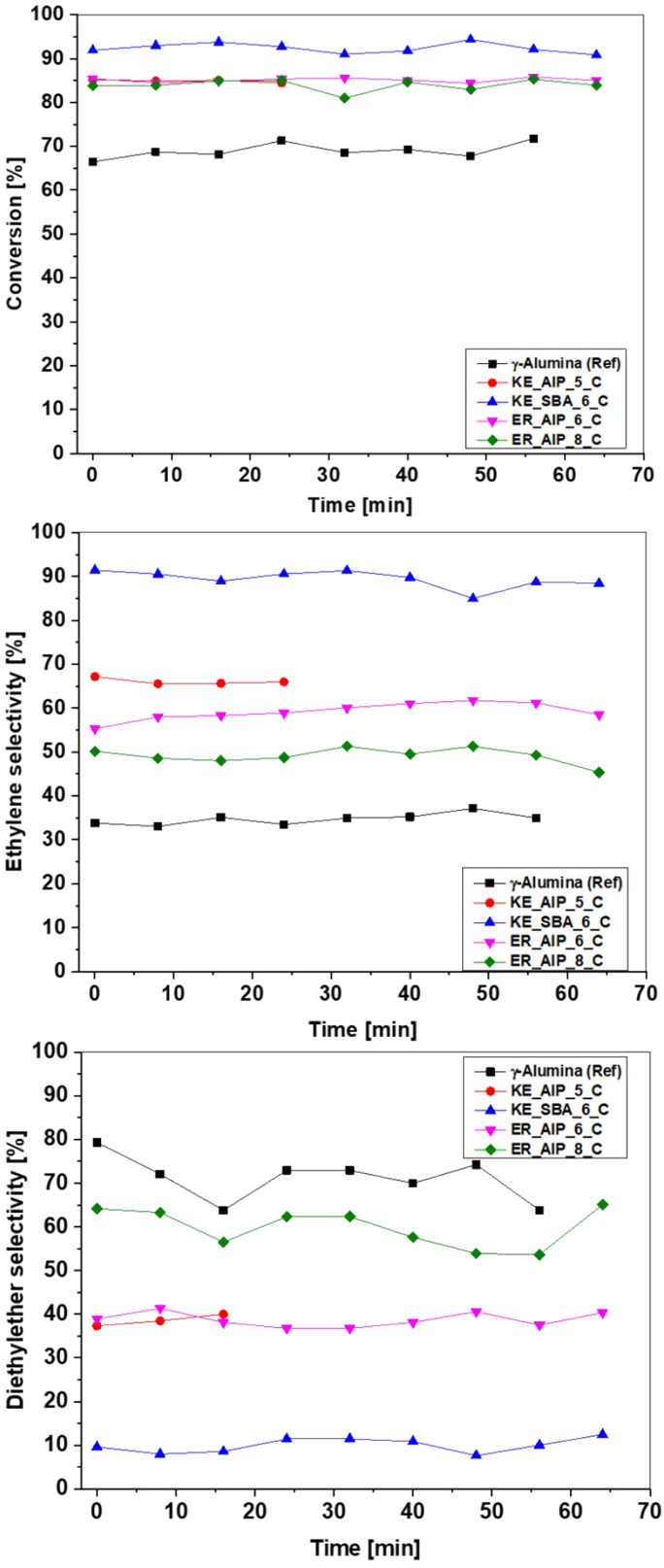
SI. 5. Pore size distribution curves for samples with hydrolysis rate h=6 and h=8. The dried extrudates are represented in black and extrudates calcined at 540 °C are represented in red.

Characterization of the extrudates made by the kneading extrusion pathway



SI. 6. Characterization of the extrudates obtained in batch synthesis by sol-gel solvent-free synthesis and shaped in a second time by the usual kneading, peptisation, neutralization, followed by extrusion pathway. Analyses are performed before and after calcination. The obtained extrudates before calcination are labeled with D (D stands for Dry), extrudates after calcination are labeled with C and ASB stands for Aluminum tri-Sec-Butoxide. a) XRD pattern; b) N_2 physisorption isotherms; c) Pore size distribution curves.

Catalytic stability during ethanol dehydration catalytic test



SI. 7. Time-on-stream evolution of ethanol conversion and Ethylene and Diethyl Ether selectivity for the tested samples at 255 °C.