Supplementary Information

Widespread formation of intracellular calcium carbonates by the bloom-forming cyanobacterium *Microcystis*

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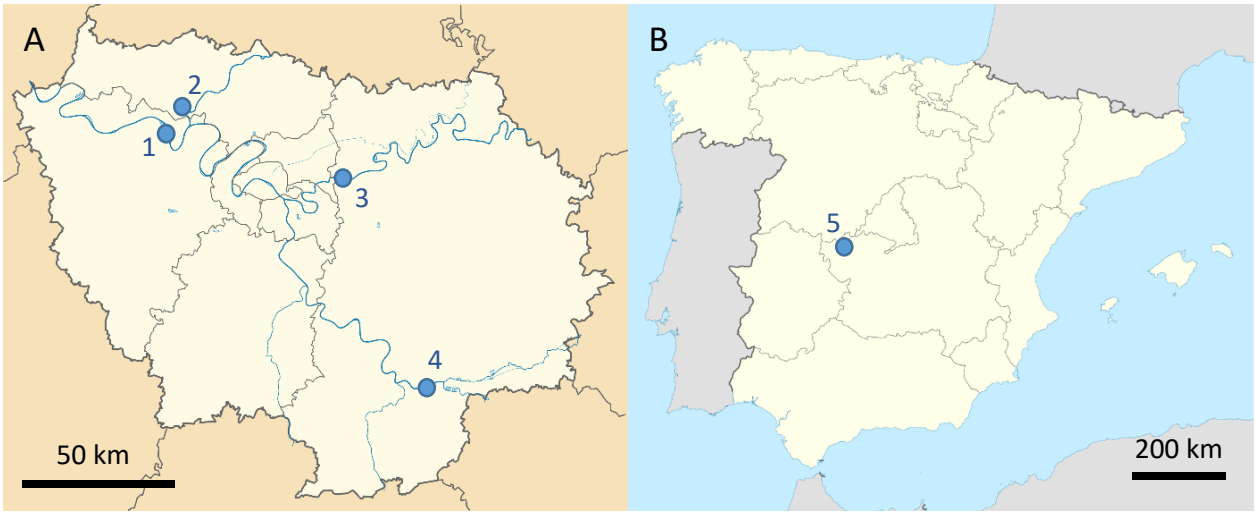
Table SI. Available genomes assemblies of *Microcystis* (n=306) and their characteristics. The presence/absence of the *ccyA* gene is indicated and the *ccyA* gene accession number is provided. Genotypic and geographic groups are indicated when available. Quality of the genomes (based on completeness, contamination and strain heterogeneity) is ranked as high-quality (HQ), medium quality (MQ) or bad quality (BQ).

Table SII. Quality information of the newly sequenced PMC genomes.

Table SIII. List of genomes from representative geographic groups and corresponding presence/absence of the *ccyA* gene. Geographic groups are defined as sets of at least 3 genomes of good quality originating from a given geographic location, at the same time period (within four months).

Figure S1: Map of the 5 sampling locations for the search of iACC in Microcystis cells under environmental conditions. (A) Map of Ile-de-France region in France, with indication of localization for lakes in Verneuil (1), Cergy-Pontoise (2), Champs-Sur-Marne (3) and Grande Paroisse (4). (B) Map of the Toledo region in Spain, with the indication of localization of Portiña lake (5).



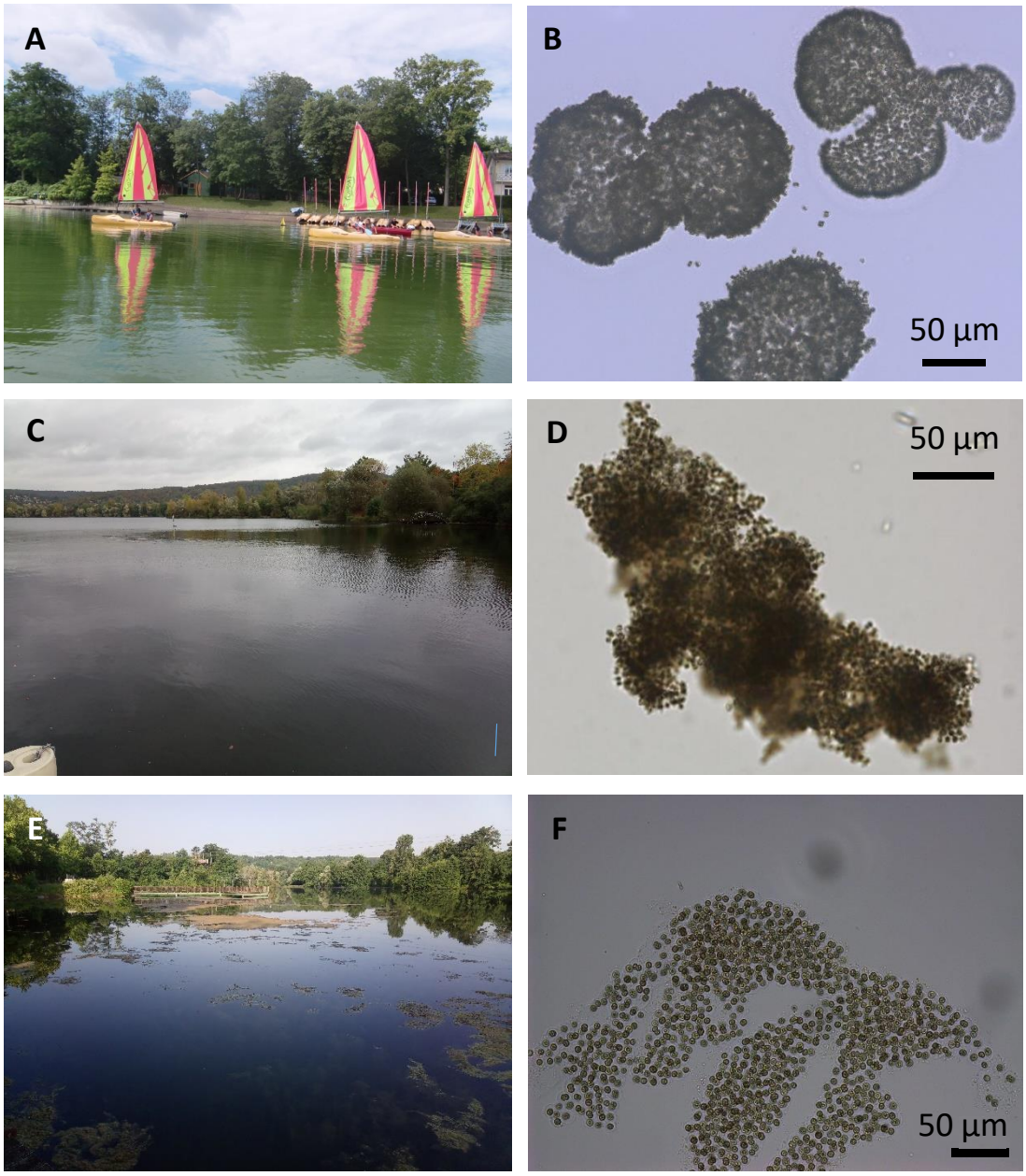
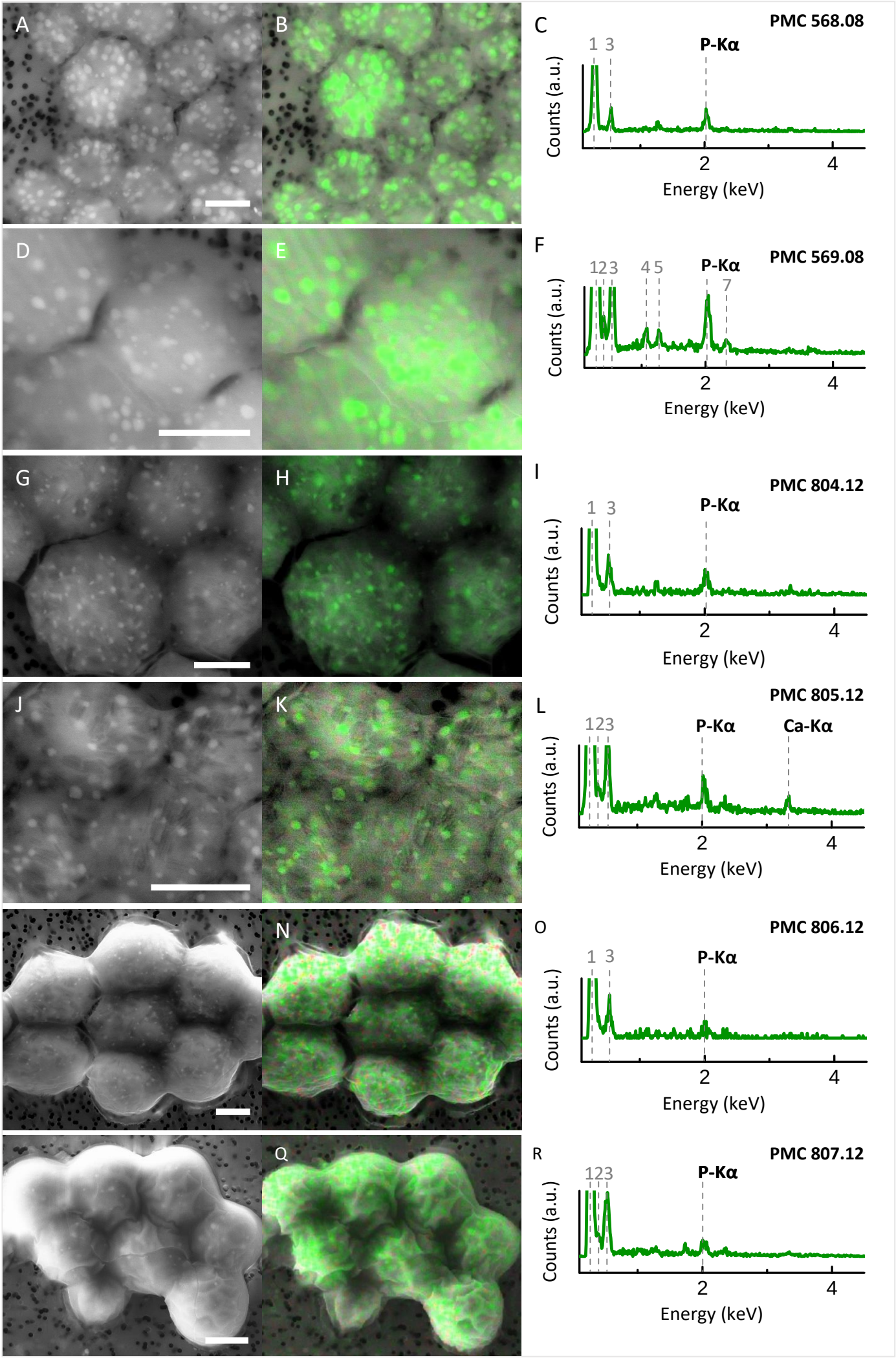


Figure S2: Light microscopy identification of *Microcystis* cells. (A-B): Picture of the Champs-Sur-Marne lake (IdF-France) and light microscopy image of *Microcystis* sp. cells collected in this lake. (C-D) Same observations for Verneuil lake (IdF-France). (E-F): Same for Cergy-Pontoise lake (IdF-France).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B
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P-Kα
Counts (a.u.)
2
4
Energy (keV)
D
E
F
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123
4 5
P-Kα
7
Counts (a.u.)
2
4
Energy (keV)
G
H
I
PMC 804.12
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P-Kα
Counts (a.u.)
2
4
Energy (keV)
J
K
L
PMC 805.12
123
P-Kα
Ca-Kα
Counts (a.u.)
2
4
Energy (keV)
N
O
PMC 806.12
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P-Kα
Counts (a.u.)
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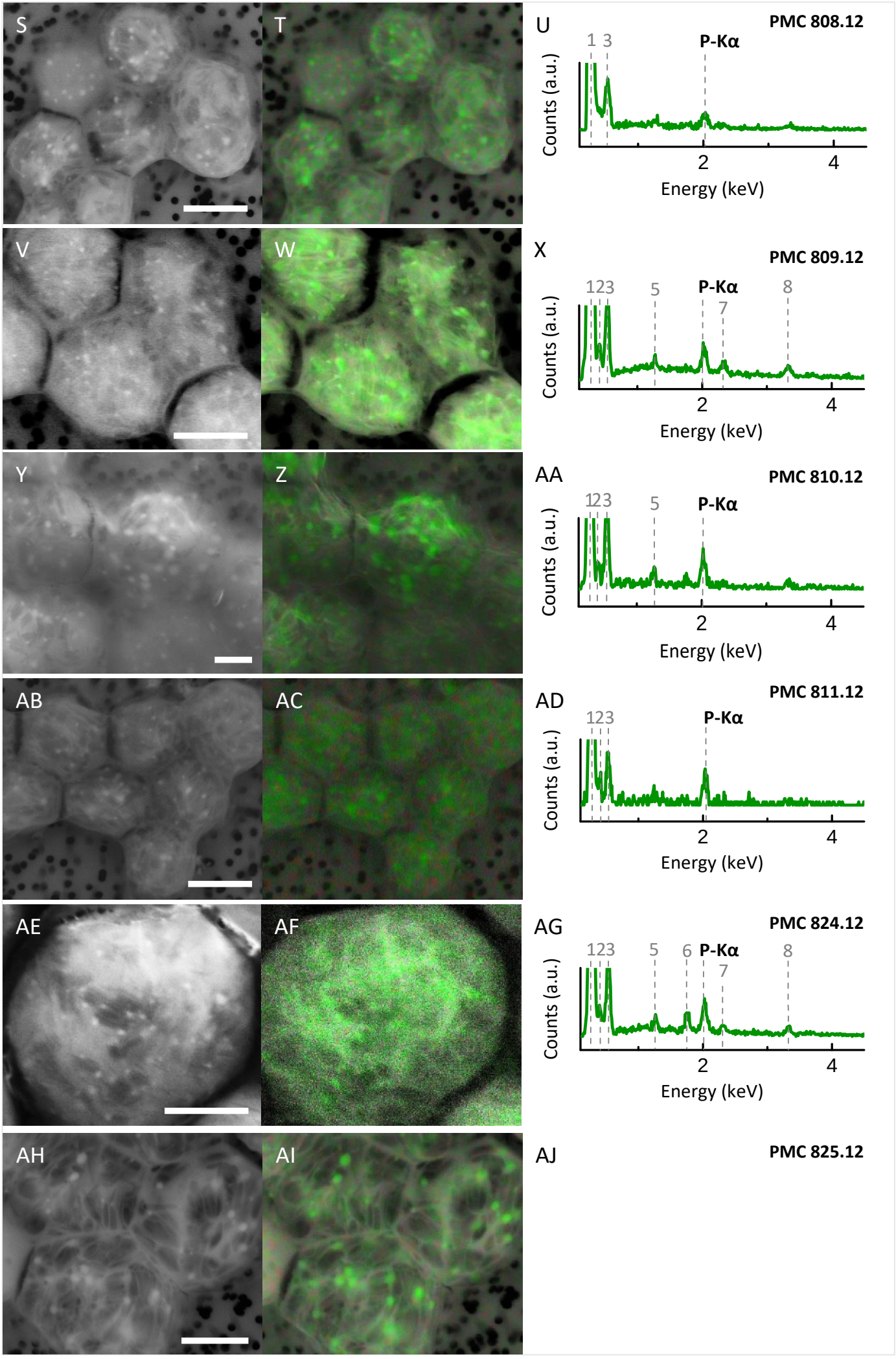
2
4
Energy (keV)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V
W
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5
P-Kα
7
8
Counts (a.u.)
2
4
Energy (keV)
Y
Z
AA
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5
P-Kα
Counts (a.u.)
2
4
Energy (keV)
AB
AC
AD
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Counts (a.u.)
2
4
Energy (keV)
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AF
AG
PMC 824.12
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Energy (keV)
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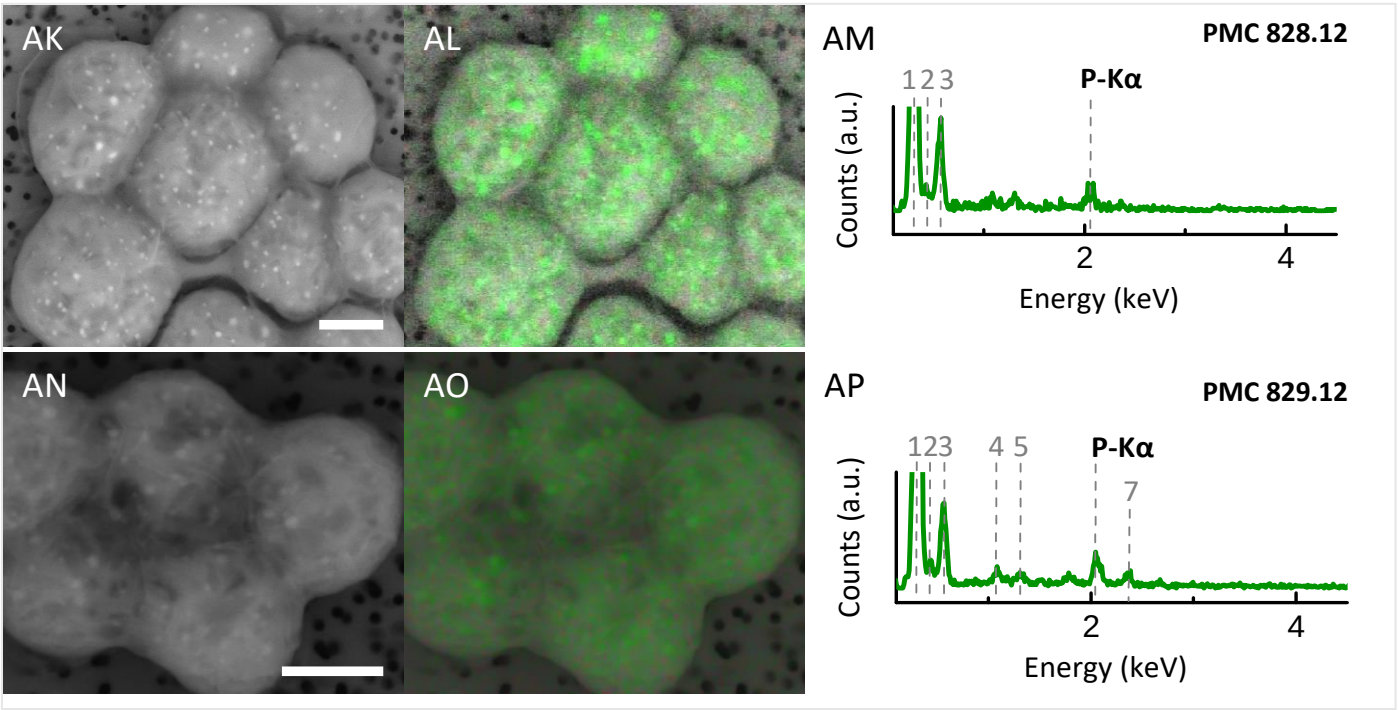
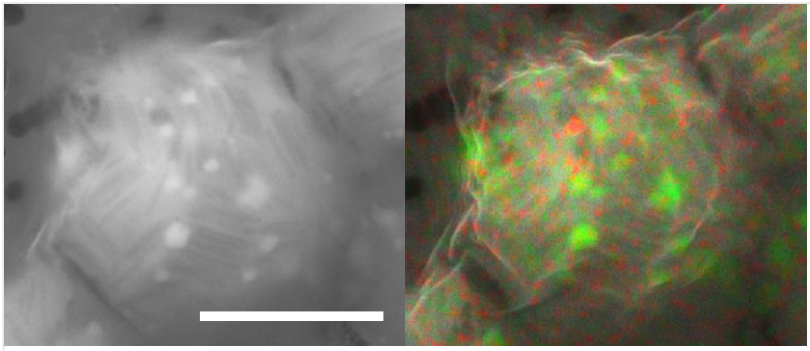


Figure S3: SEM analyses of *Microcystis* cultured strains forming PolyP granules only. (A-C): SEM image of cultured cells of *Microcystis* PMC 568.08. Corresponding overlay of AsB image and SEM-EDX maps of Ca (red) and P (green). As a result, PolyP granules appear in green. EDXS spectrum of green spots (D-F): Same data for PMC 569.08. (G-I): PMC 804.12. (J-L): PMC 805.12. (M-O): PMC 806.12. (P-R): PMC 807.12. (S-U): PMC 808.12. (V-X): PMC 809.12. (Y-AA): PMC 810.12. (AB-AD): PMC 811.12. (AE-AG): PMC 824.12. (AH-AJ): PMC 825.12. (AK-AM): PMC 828.12. (AN-AP): PMC 829.12. The labels of the emission lines in the EDXS spectra are: (1): C Kα; (2) N Kα; (3) O Kα; (4) Na Kα; (5) Mg Kα; (6): Si Kα; (7): S Kα; (8): K Kα.



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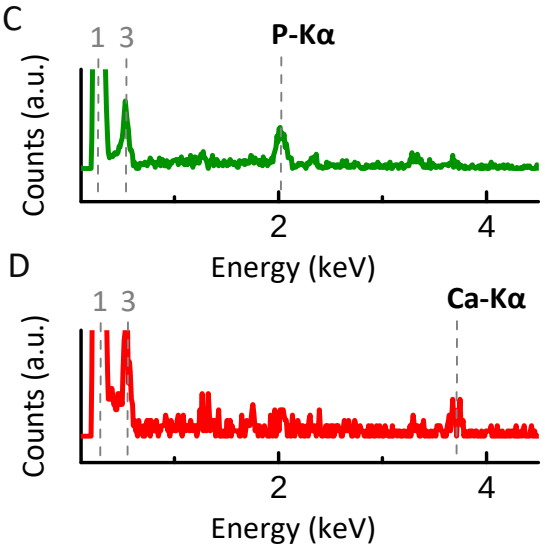

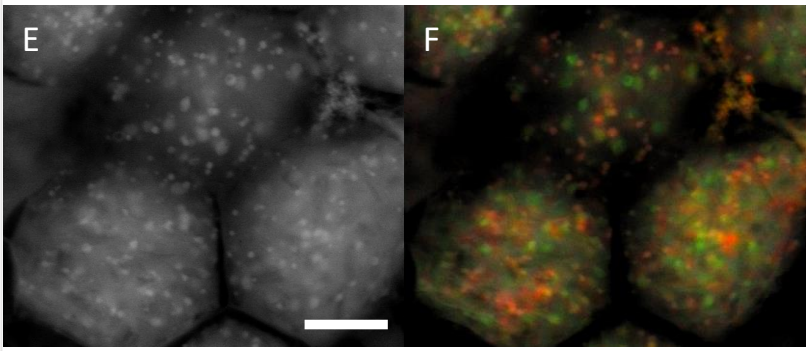

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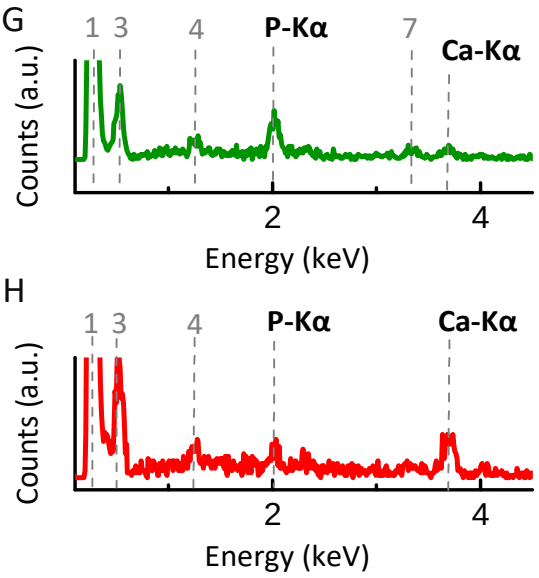

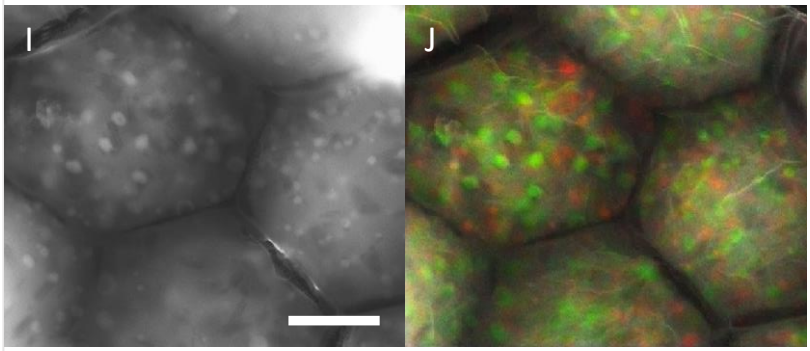

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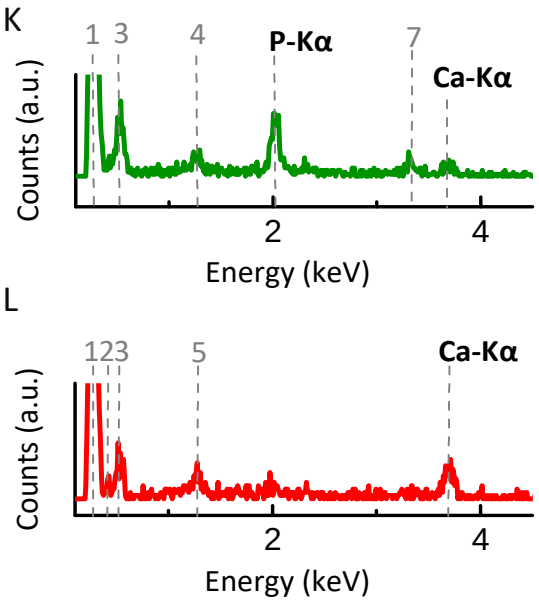

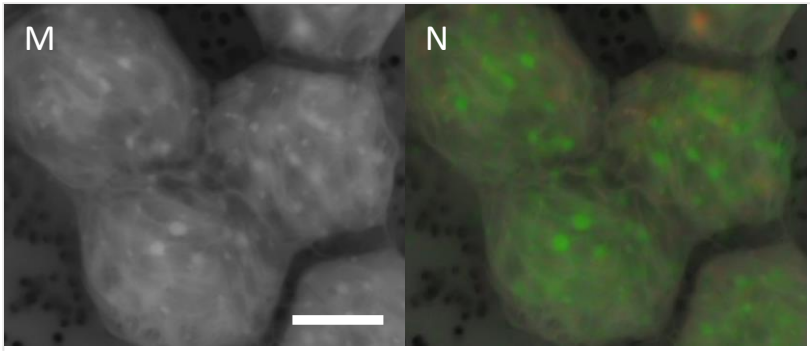

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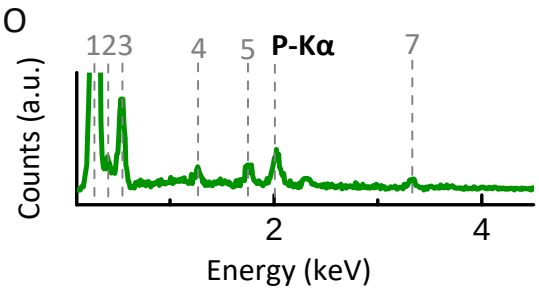

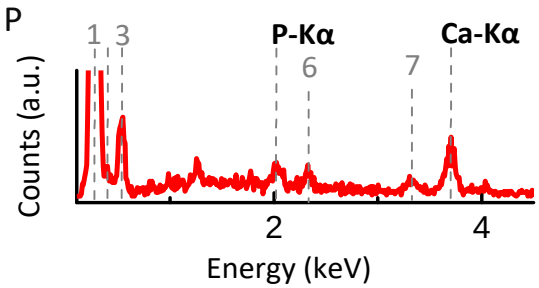

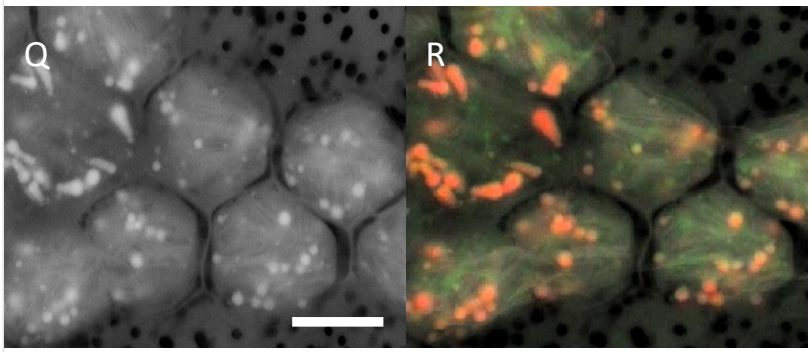

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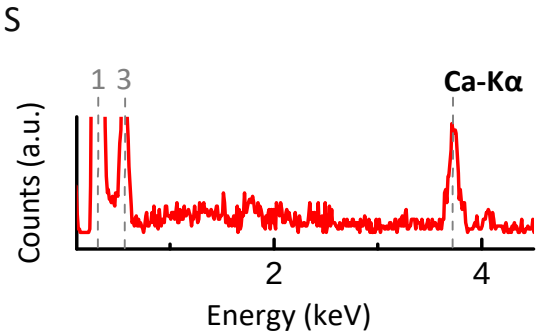

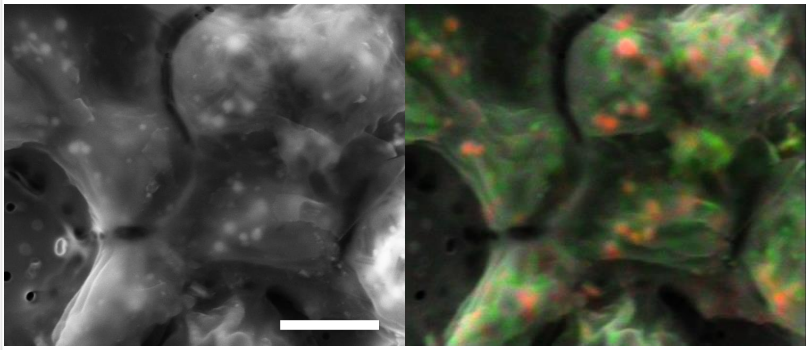

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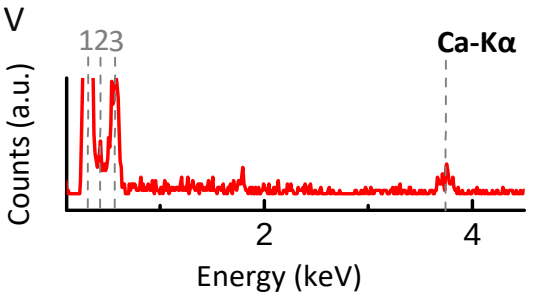

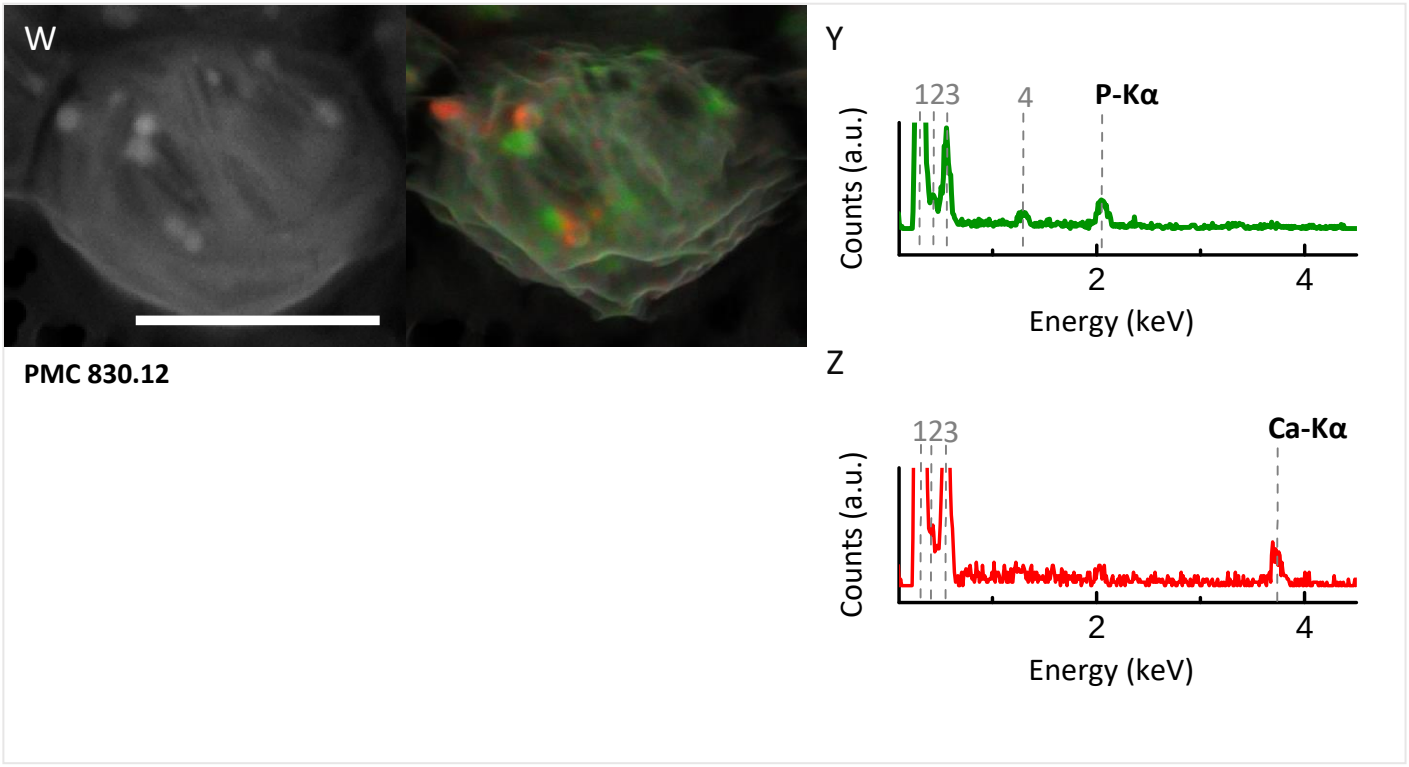

Figure S4: SEM analyses of *Microcystis* cultured strains forming iACC and PolyP granules, or iACC granules only. (A-E): SEM image of *Microcystis* PMC 814.12, with the corresponding overlay of AsB image and SEM-EDX maps of Ca (red) and P (green), and EDXS spectra of green and red spots observed in the overlay. Ca-carbonates appear in red and PolyP granules appear in green. (E-H): PMC 815.12. (I-L): PMC 816.12. (M-P) PMC 821.12. (Q-T) PMC 823.12. (U-W): PMC 826.12. (Y-AA): PMC 827.12. (AB-AE): PMC 830.12. The labels of the emission lines in the EDXS spectra are: (1): C Kα; (2) N Kα; (3) O Kα; (4) Mg Kα; (5) Si Kα (6): S Kα; (7): K Kα.