

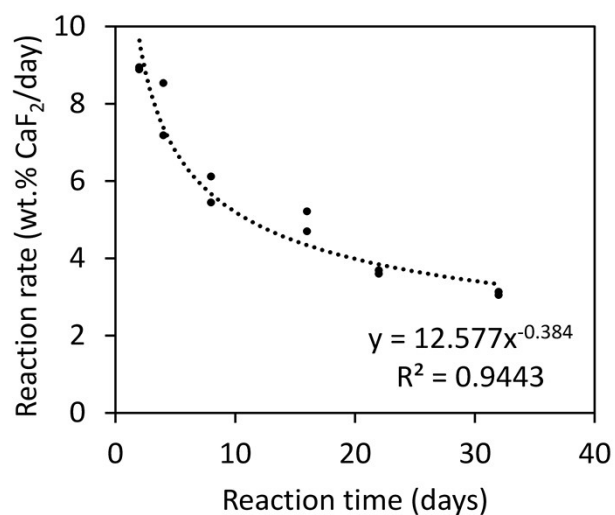
## Supporting Information

### Annex A – Calcite single crystals purity

**Table A1.** Resume of ICP-OES measurements.

Element	Concentration (ppm)	%
CaCO <sub>3</sub>	-	99.97
Fe	0.05	0.00
Mg	5.15	0.02
Mn	0.48	0.00
Sr	2.16	0.01
Zn	0.71	0.00

### Annex B - Relevant plots



**Figure B1.** Power-law reaction rate decrease of the replacement of calcite by fluorite in function of time.

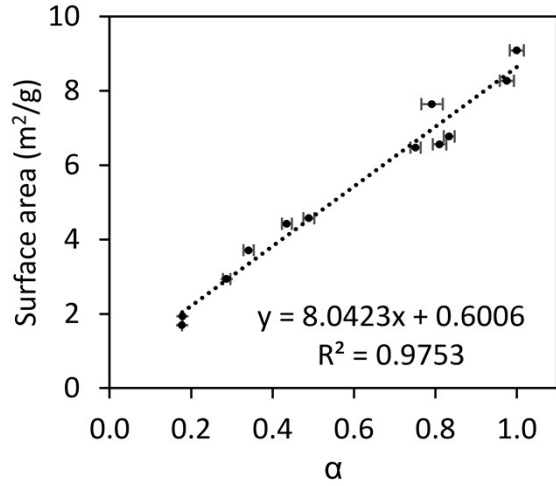


Figure B2. Linear correlation between the surface area and the fraction of fluorite ( $\alpha$ ) in the samples.

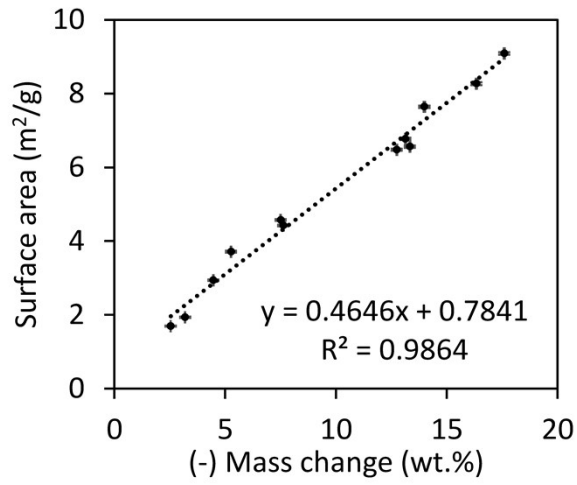
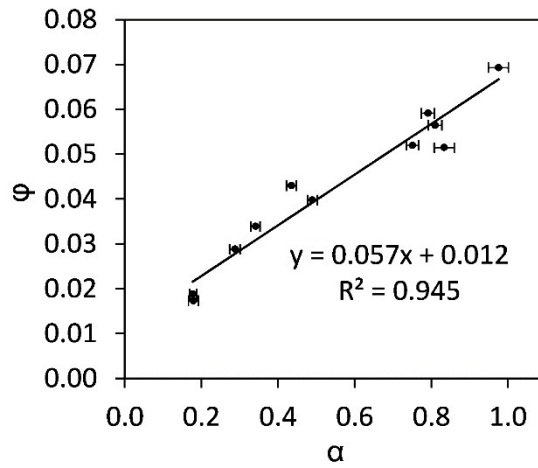
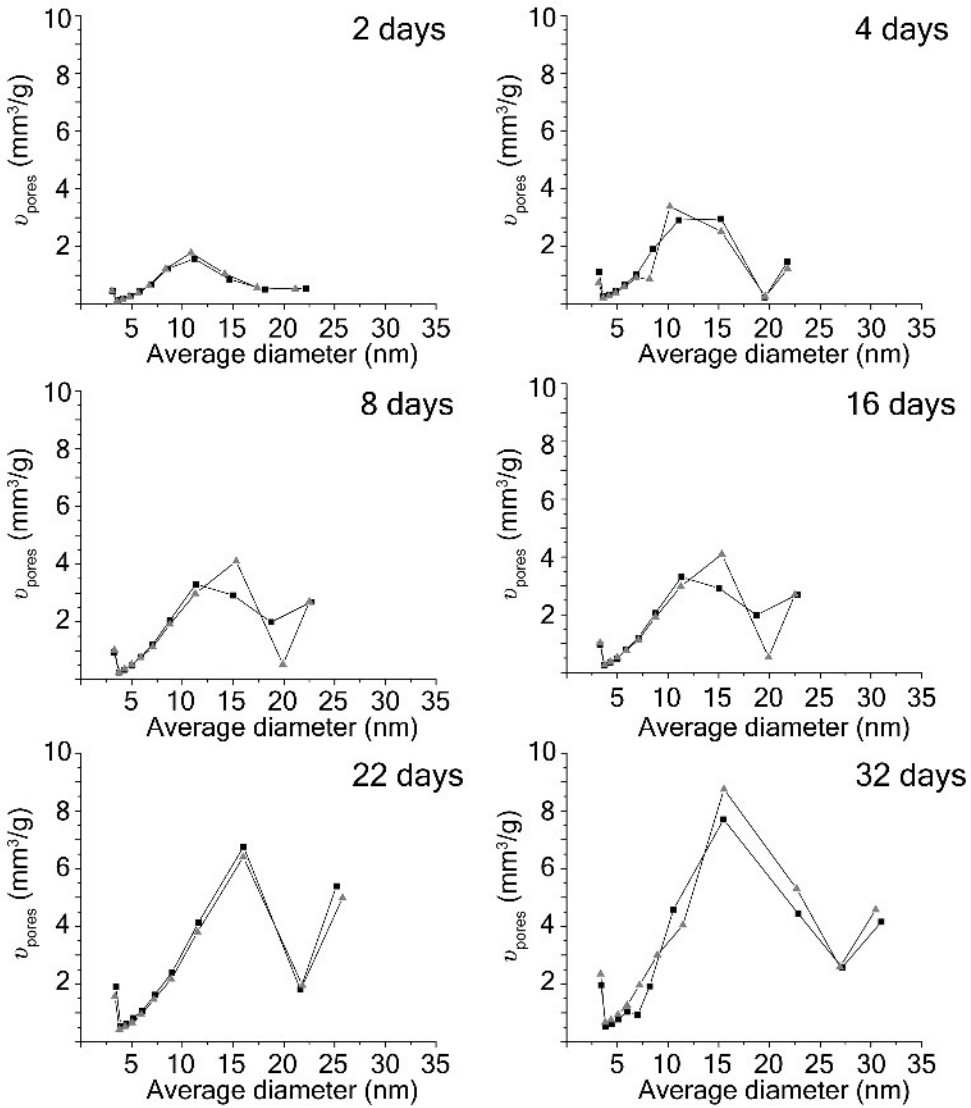


Figure B3. Linear correlation between the surface area and the samples mass change.



**Figure B4.** Linear correlation between the calculated open porosity ( $\phi$ ) from the N<sub>2</sub> adsorption measurements and the fraction of fluorite in the samples ( $\alpha$ ).

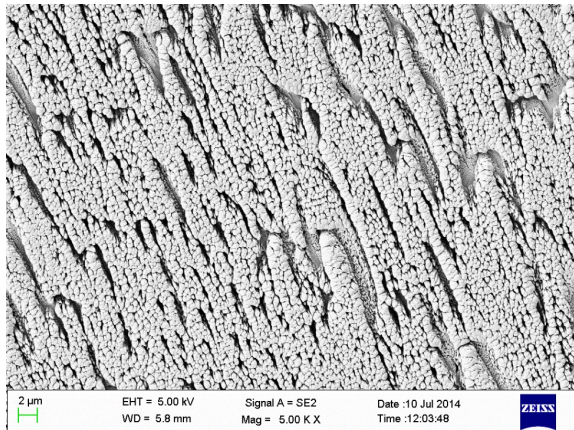


**Figure B4.** Pore size distributions.

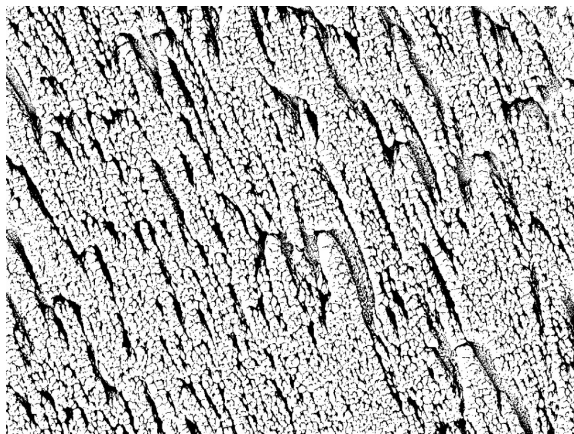
Annex C - Image segmentation (IS)

IS-1

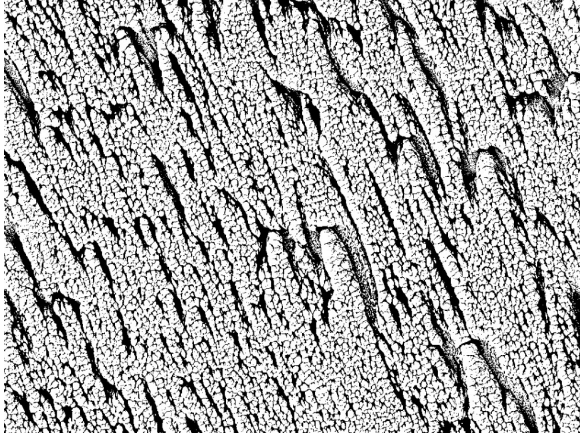
Secondary electron (SE) image:



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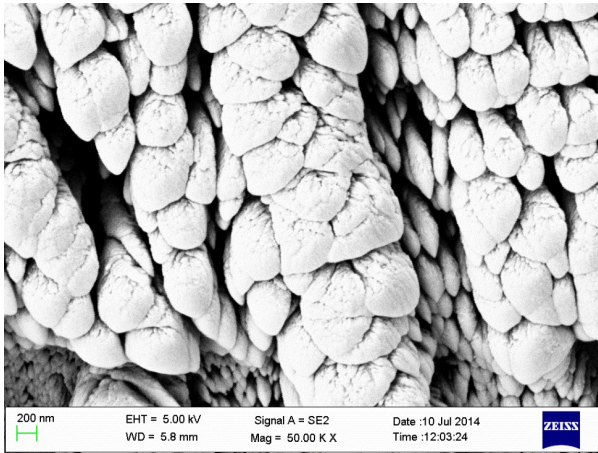


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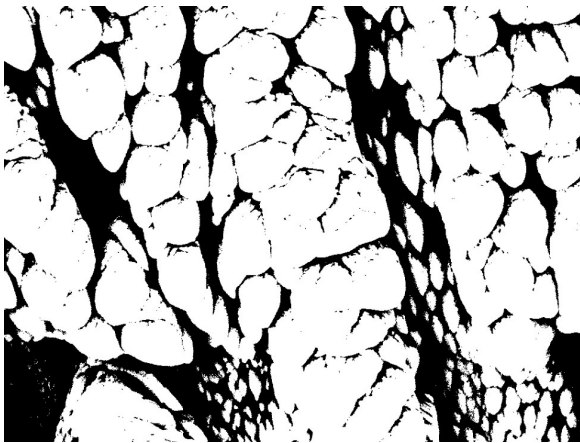


IS-2

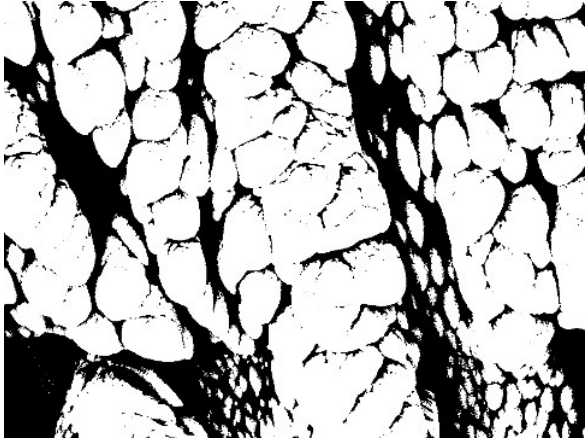
SE:



Mask 1:

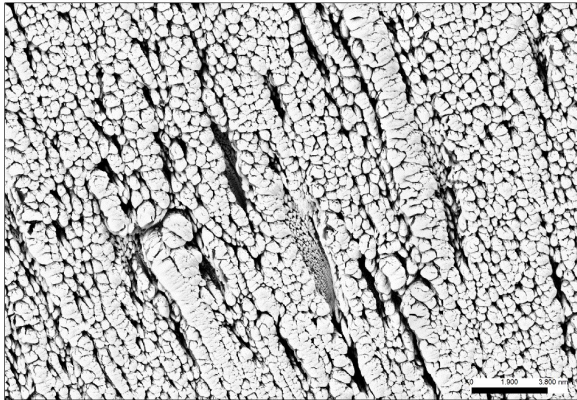


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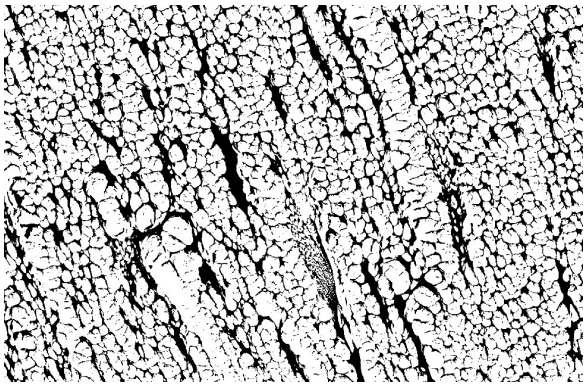


IS-3

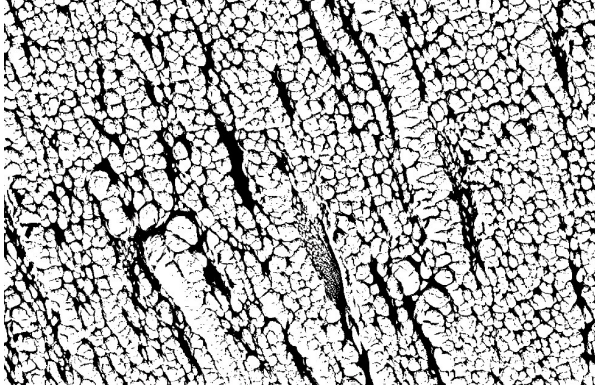
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Mask 1

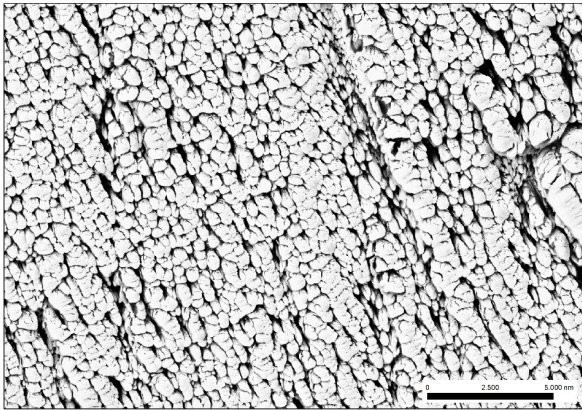


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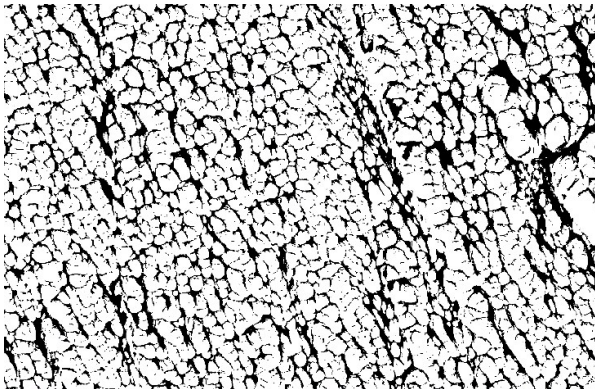


IS-4

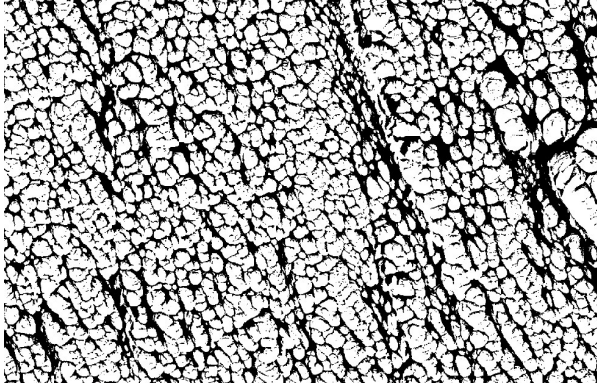
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Mask 1

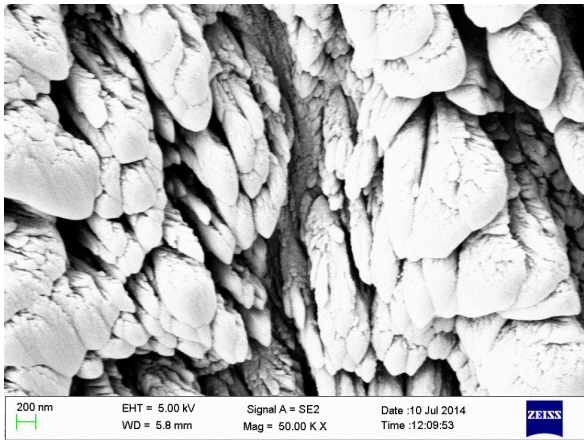


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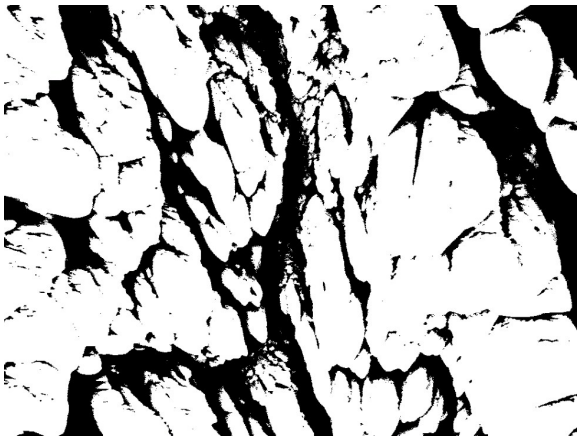


IS-5

SE:

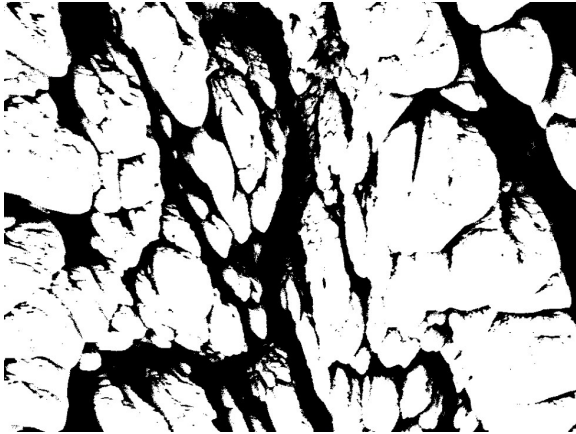


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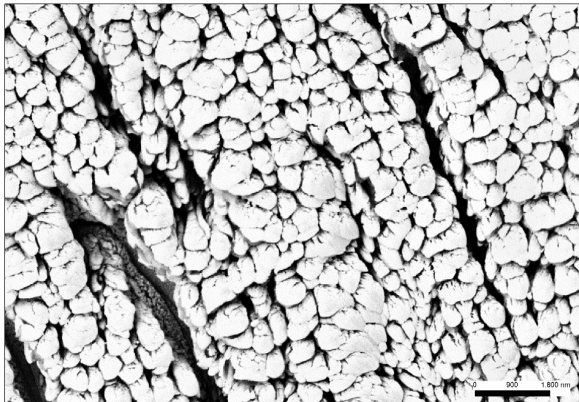


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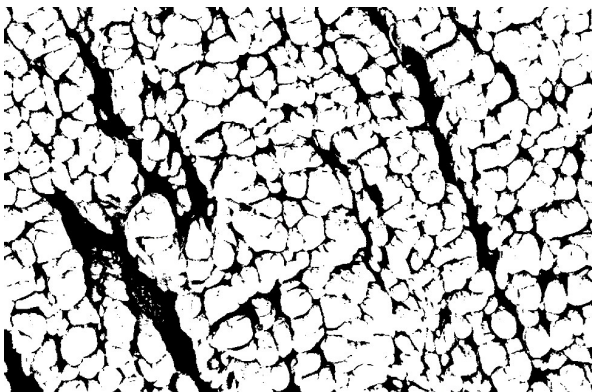


SI-6

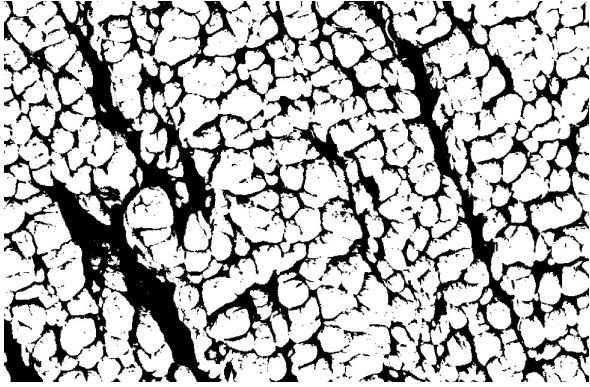
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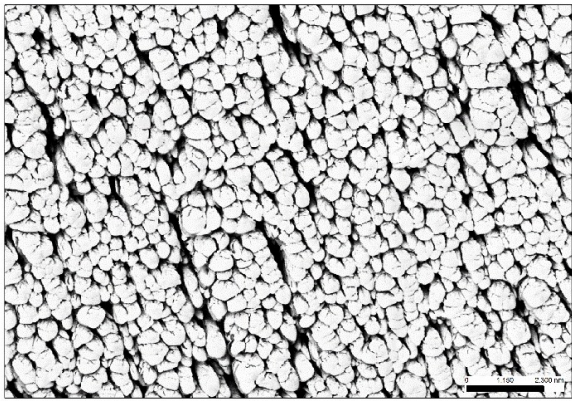


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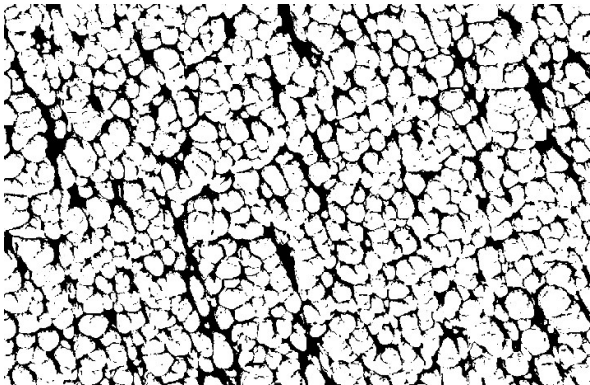


IS-7

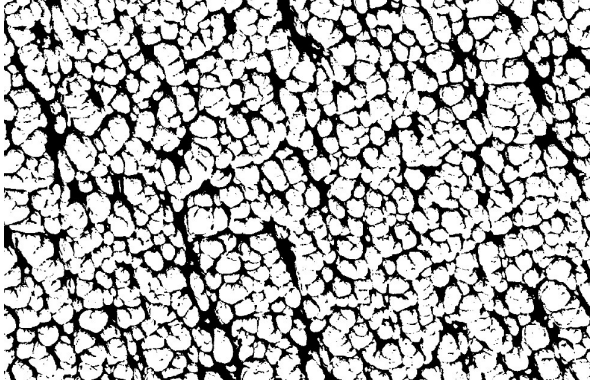
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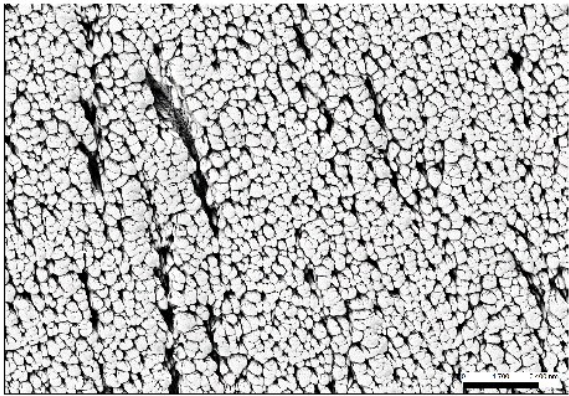


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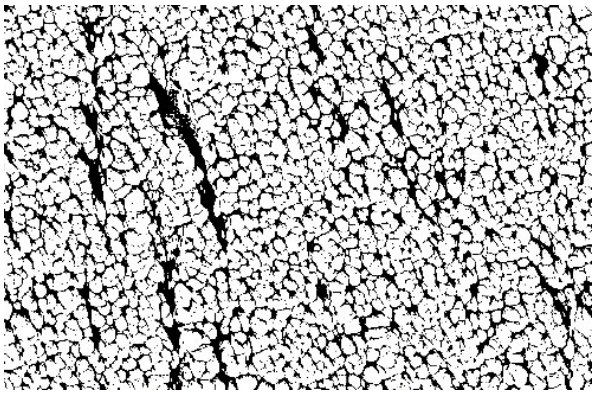


SI-8

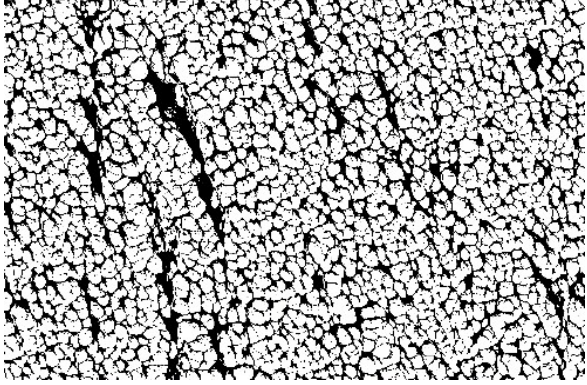
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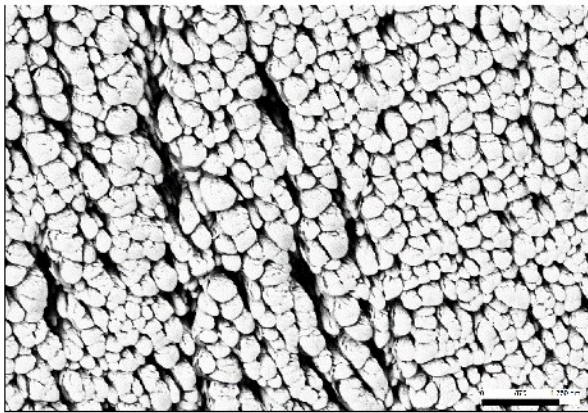


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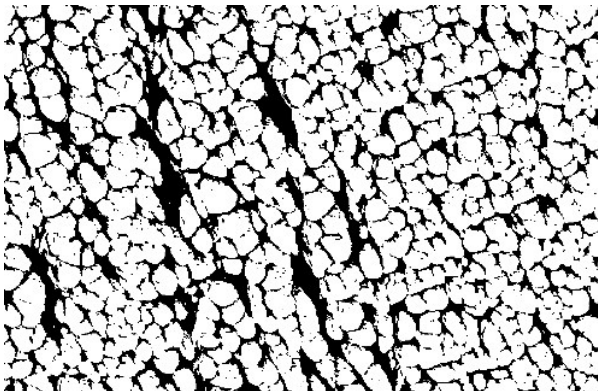


SI-9

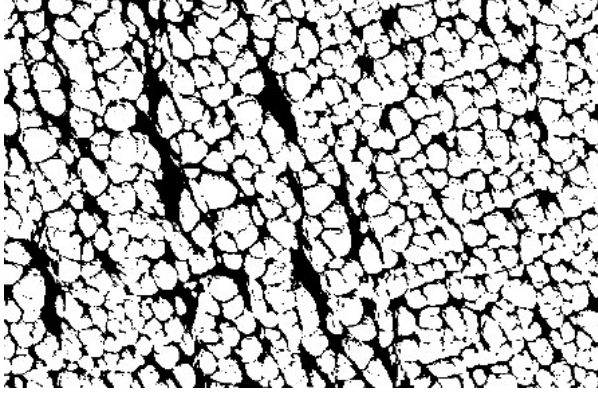
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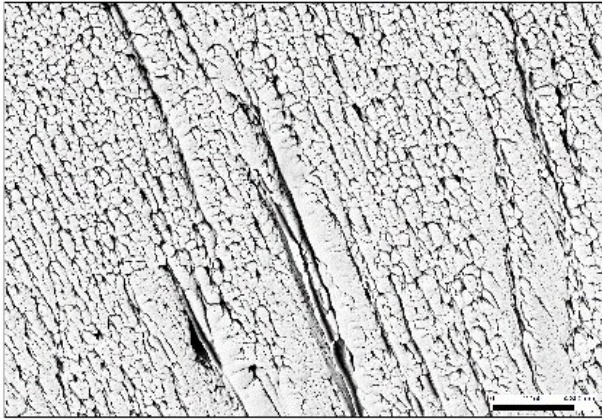


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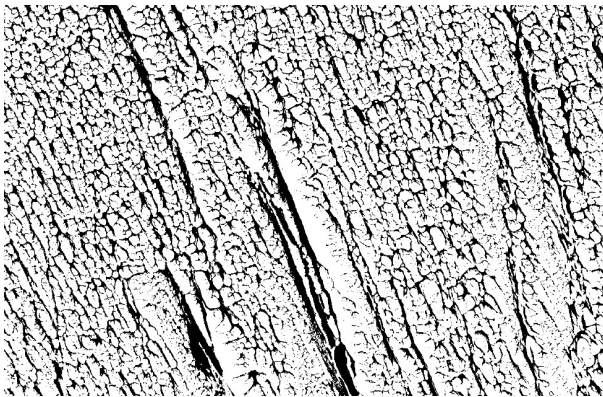


SI-10

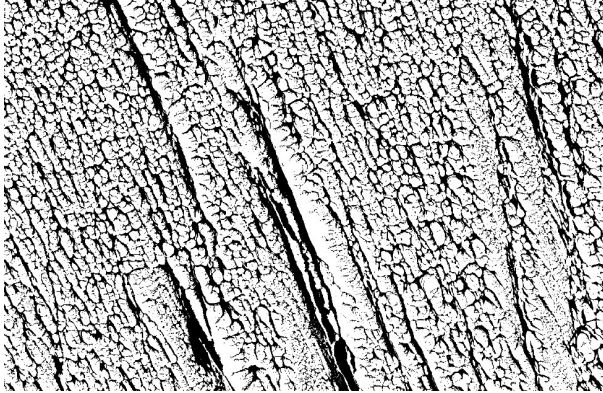
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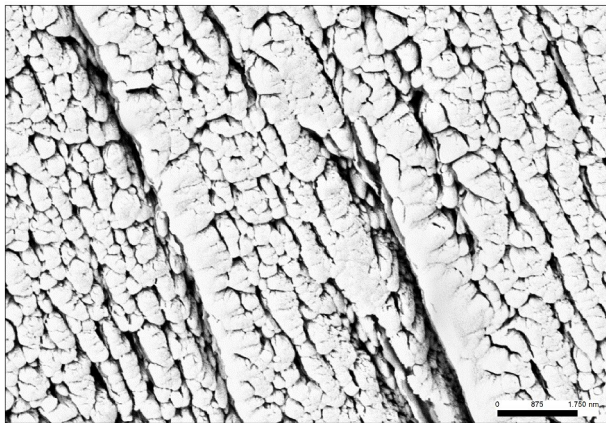


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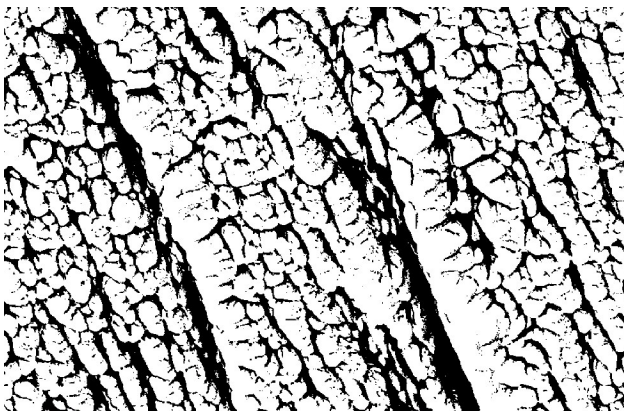


SI-11

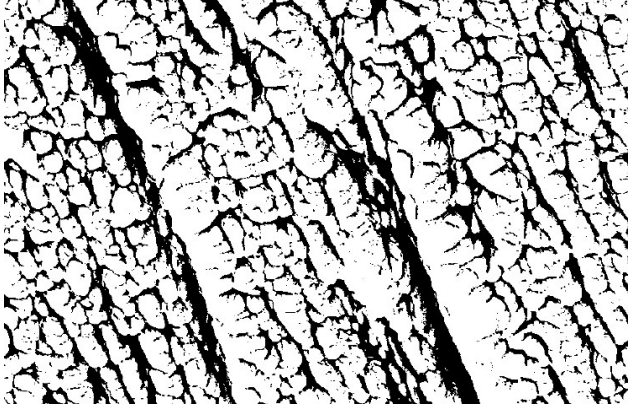
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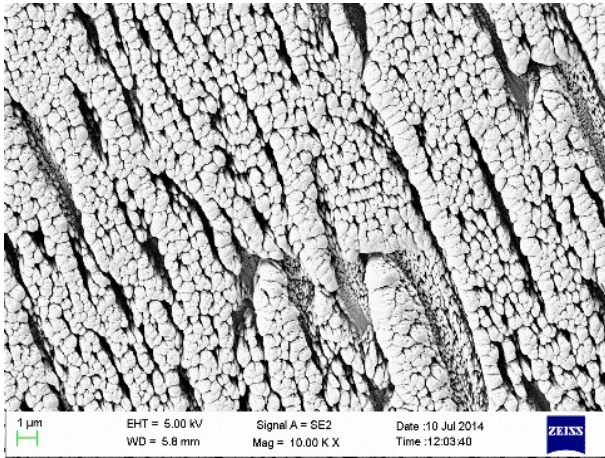


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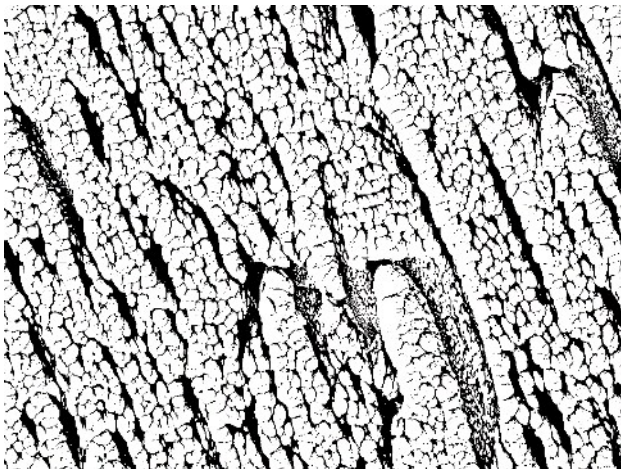


IS-12

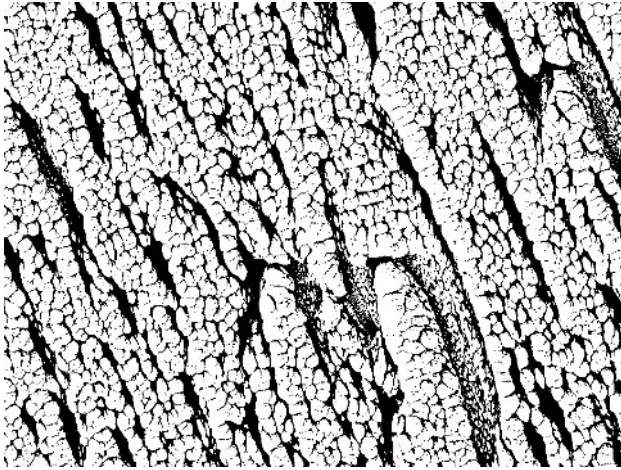
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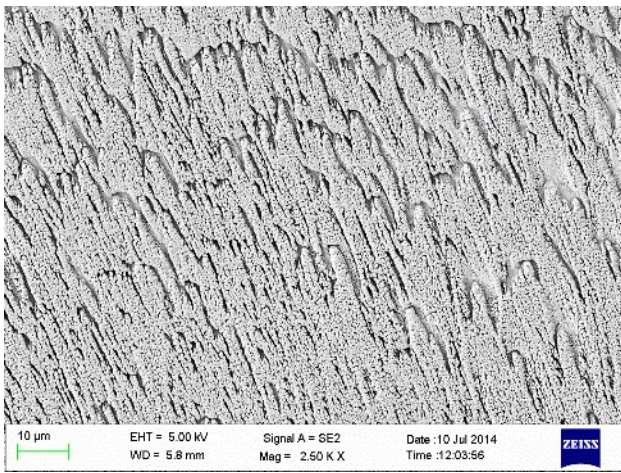


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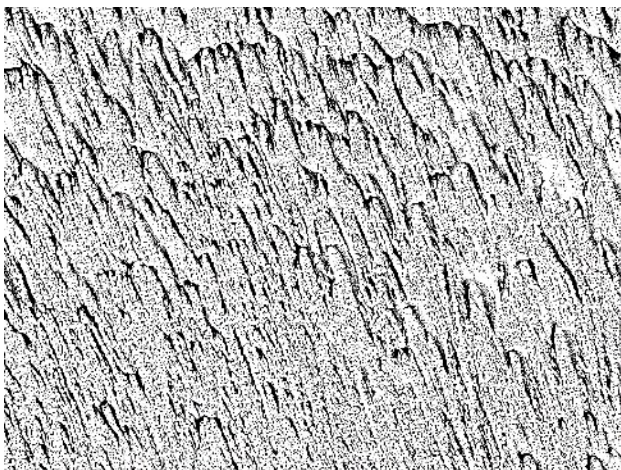


IS-13

SE

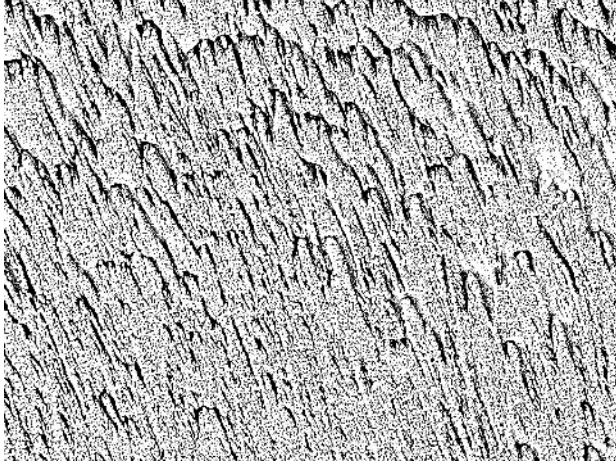


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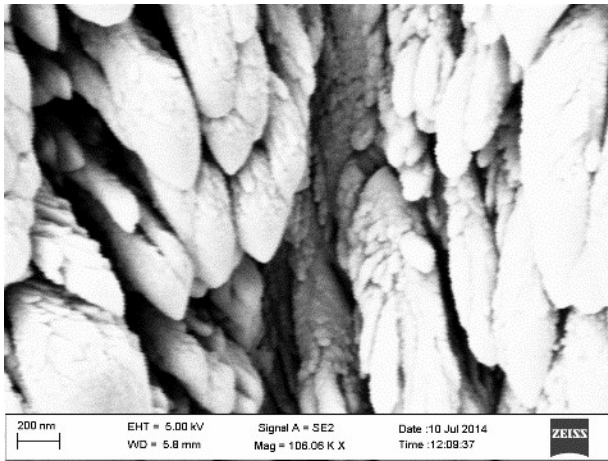
Mask 2:





IS-14

SE:



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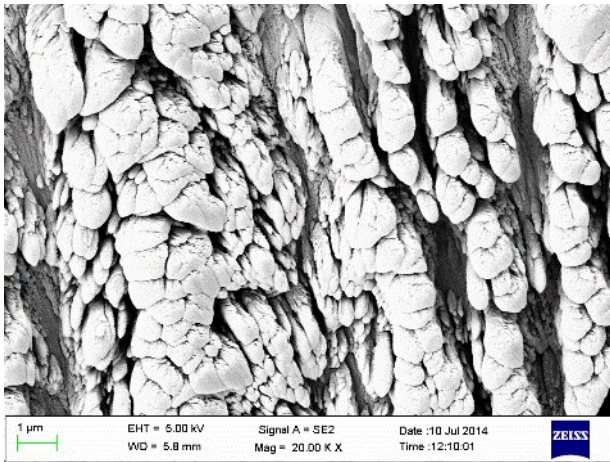


Mask 2:



IS-15

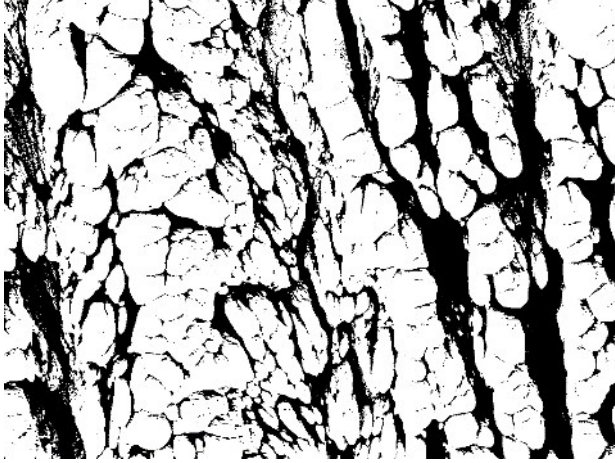
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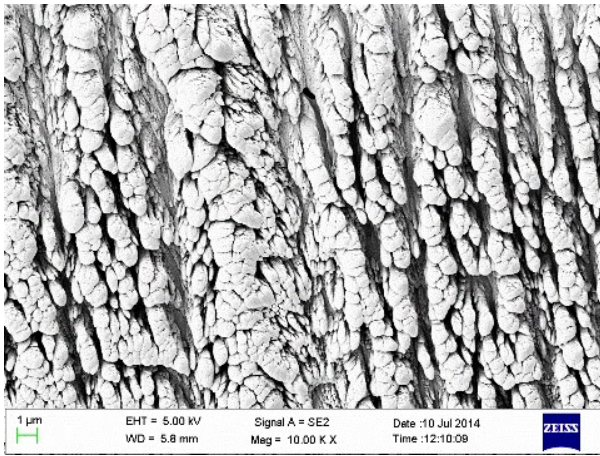


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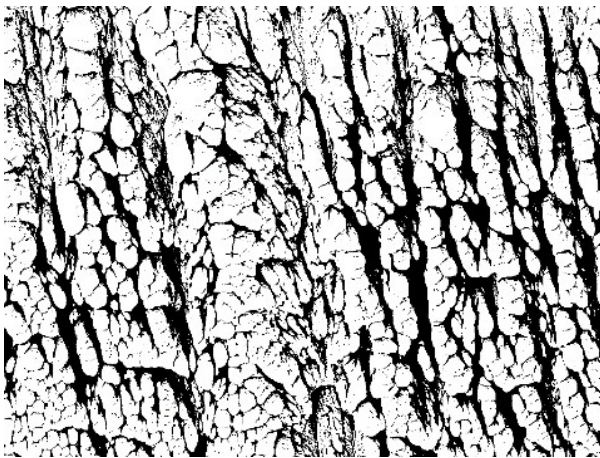


IS-16

SE:



Mask 1:



Mask 1:



Table B1. Background (black areas) percentages in each mask.

Code	Mask	Background (%)
IS-1	1	27.07
	2	33.39
IS-2	1	27.08
	2	29.04
IS-3	1	30.12
	2	26.10
IS-4	1	33.82
	2	24.51
IS-5	1	27.01
	2	32.62
IS-6	1	25.33
	2	30.40
IS-7	1	30.92
	2	25.31
IS-8	1	30.73
	2	26.26
IS-9	1	26.78
	2	29.46
IS-10	1	30.48
	2	25.19
IS-11	1	29.53
	2	27.38
IS-12	1	27.40
	2	30.61
IS-13	1	27.09
	2	29.82
IS-14	1	29.69
	2	32.31
IS-15	1	32.72
	2	30.84
IS-16	1	32.59
	2	30.56

Mean and SD	29. 1 ± 2.6
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