Electronic Supplementary Material (ESI) for Nanoscale.

SUPPORTING INFORMATION

Non-aqueous solution-processed phosphorene by controlled low-potential electrochemical exfoliation and thin films preparation

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Supporting Information Contains:

Figure S1 The experimental LSV curves recorded during electrochemical exfoliation of BP in 0.01 M $TBAPF_6$/DMF at various potentials: from 0 to -1V (a), from -1 to -2.5V (b) and from -2.5 to -3.8V (c).

Figure S2 The experimental LSV curves recorded during electrochemical exfoliation of BP in 0.01 M $TBAPF_6$/AN at various potentials: from 0 to -1V (a), from -1 to -2.5V (b) and from -2.5 to -3.8V (c).

Figure S3 Photographs of the electrochemical exfoliation process of BP in 0.01 M $TBAPF_6$/DMF at various times and potentials.

Figure S4 Photographs of the electrochemical exfoliation process of BP in 0.01 M $TBAPF_6$/AN at various times and potentials.

Figure S5 The effect of ultrasonication duration on the FP particles size distribution in the collected supernatant (a – in DMF, c – in AN) and precipitate (b – in DMF, d – in AN) in a solvent medium.

Figure S6 The effect of ultrasonication duration (15–65 min) on the FP particles alignment on the polypropylene membrane (0.4 μm pore size), transferred by the vacuum filtration: optical images (a, c, e, g, I, k); a vertical cross-section from the surface (b, d, f, h, j, l). FP was obtained in the 0.01 M $TBAPF_6$/DMF medium during electrochemical exfoliation of BP.

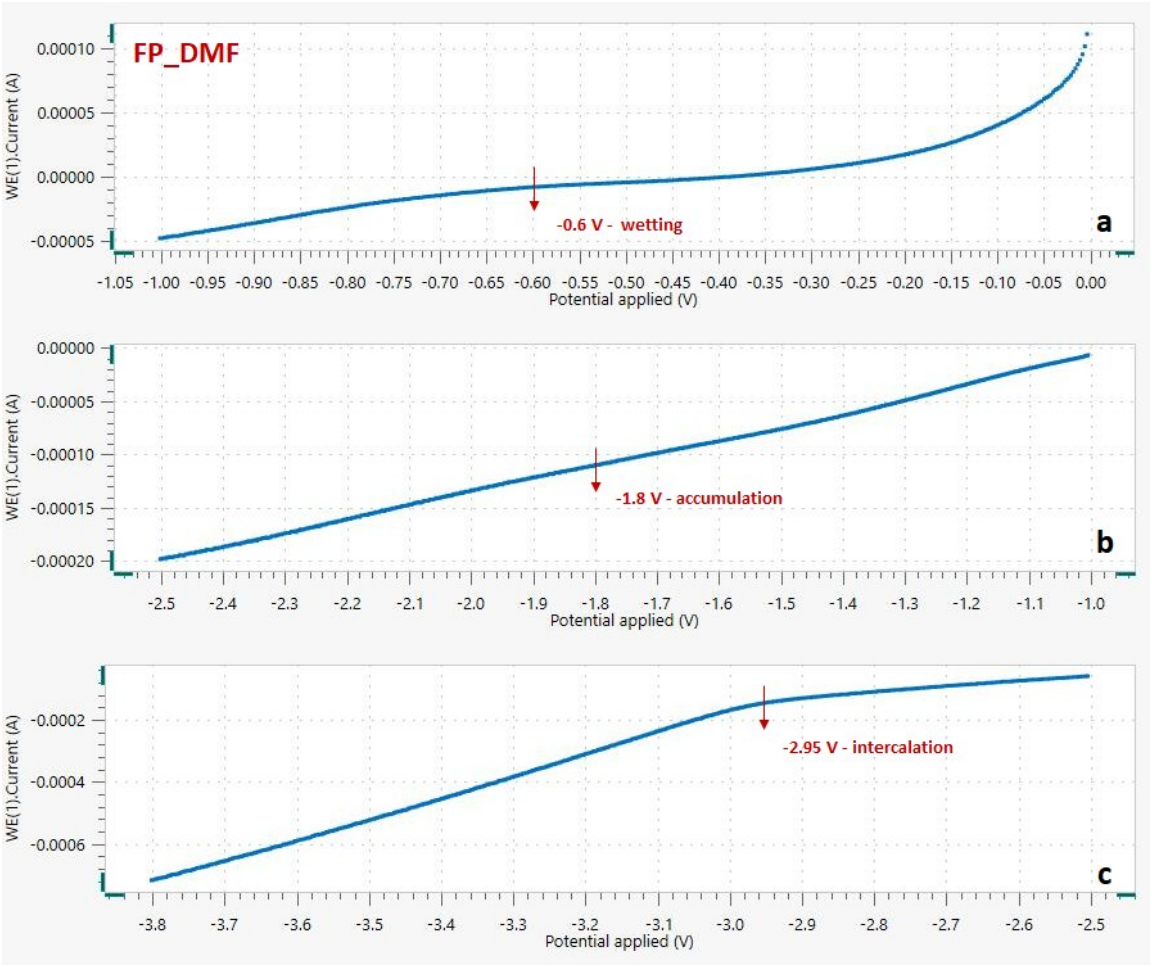
Figure S7 The effect of ultrasonication duration (15–65 min) on the FP particles alignment on the polypropylene membrane (0.4 μm pore size), transferred by the vacuum filtration: optical images (a, c, e, g, I, k); a vertical cross-section from the surface (b, d, f, h, j, l). FP was obtained in the 0.01 M $TBAPF_6$/AN medium during electrochemical exfoliation of BP.

Figure S8 SEM-EDX elemental maps showing the distribution of phosphorus and oxygen: FP exfoliated in DMF and AN.

Figure S9 TEM-EDX elemental maps showing the distribution of phosphorus and oxygen: FP exfoliated in DMF and AN.

Figure S10 Thin films characterization. Digit images of the FP films transferred on the Si/SiO_2 (a) and quartz (b) wafers by IPA support method. Comparable Raman spectra of FP films transferred on the various substrates (c) versus BP bulk demonstrated by the red dash lines and corresponds to the evident A_g^1, B_{2g} and A_g^2 features at 361, 439 and 465 cm^{-1} respectively.

Figure S11 FP particles alignment in thin-film forms transferred to the quartz (a, b) and Si/SiO_2 (c, d) wafers via IPA support method. Topographical map, where colors are coding the Z-heights (a, c). A vertical cross-section from the surface (b, d).



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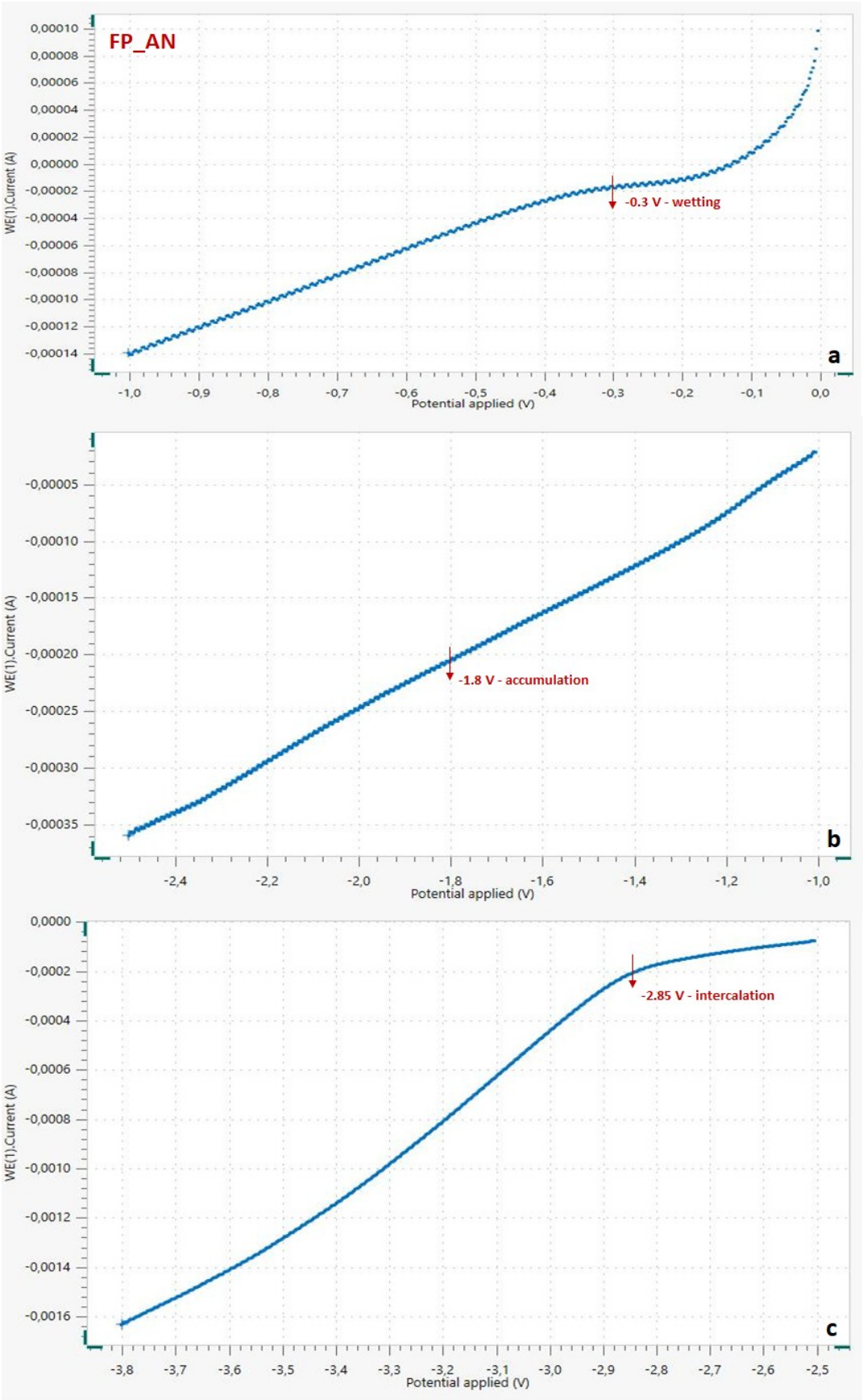

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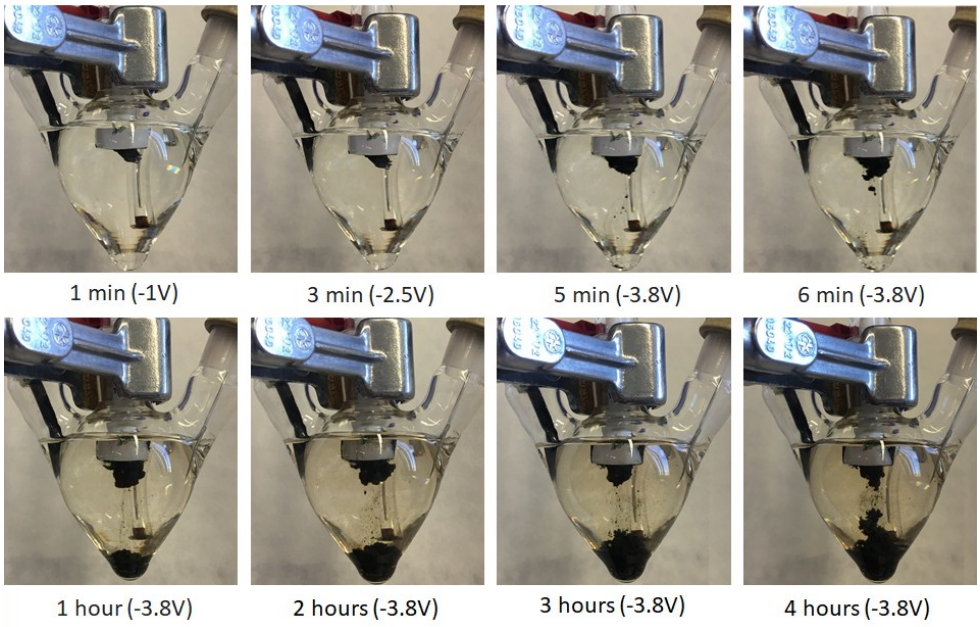

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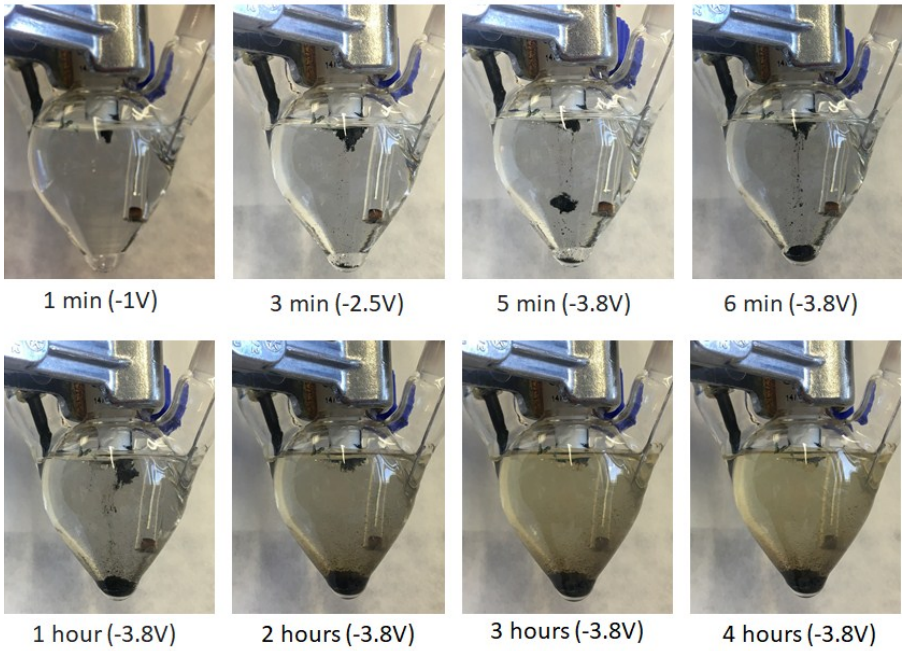

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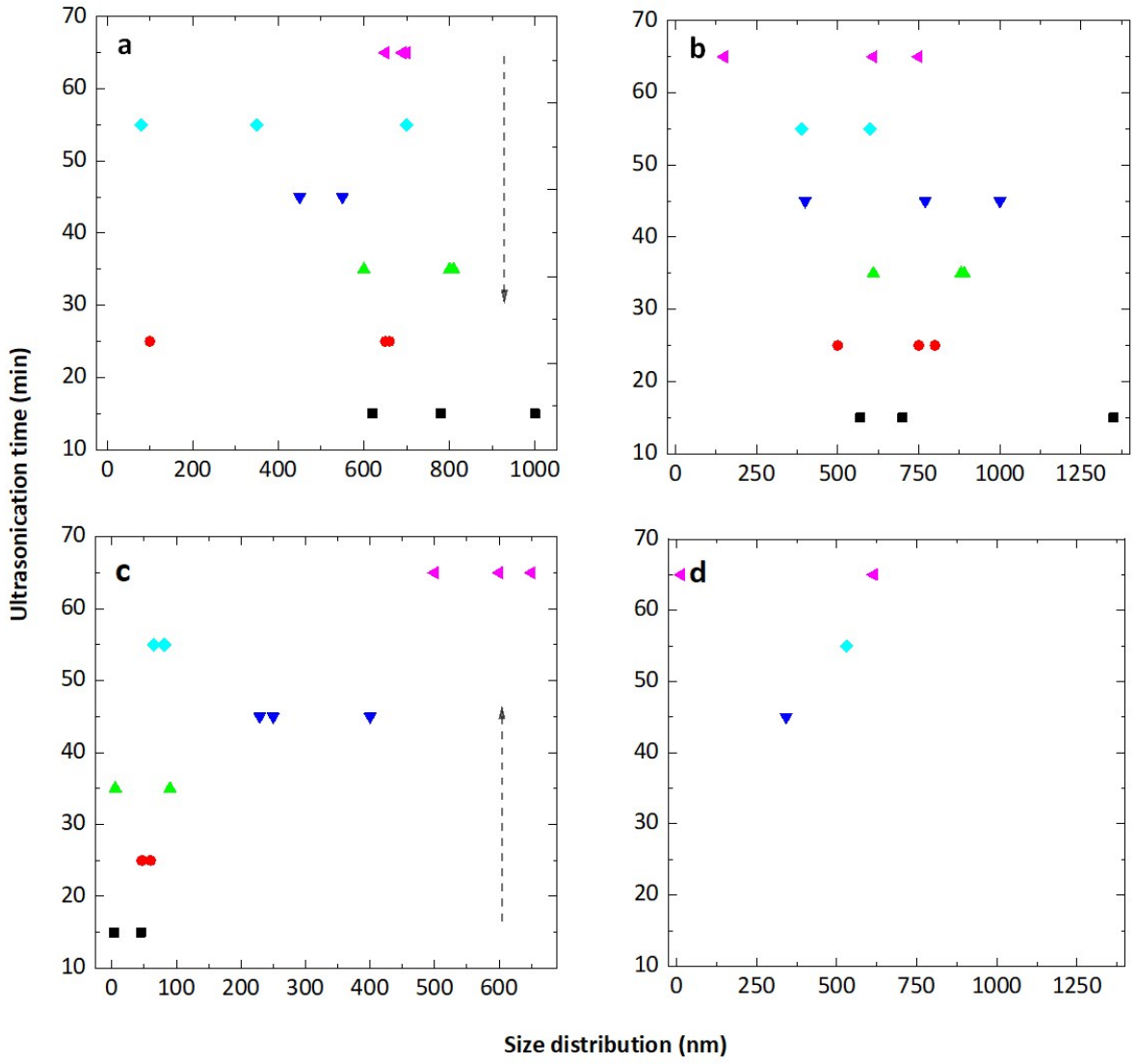

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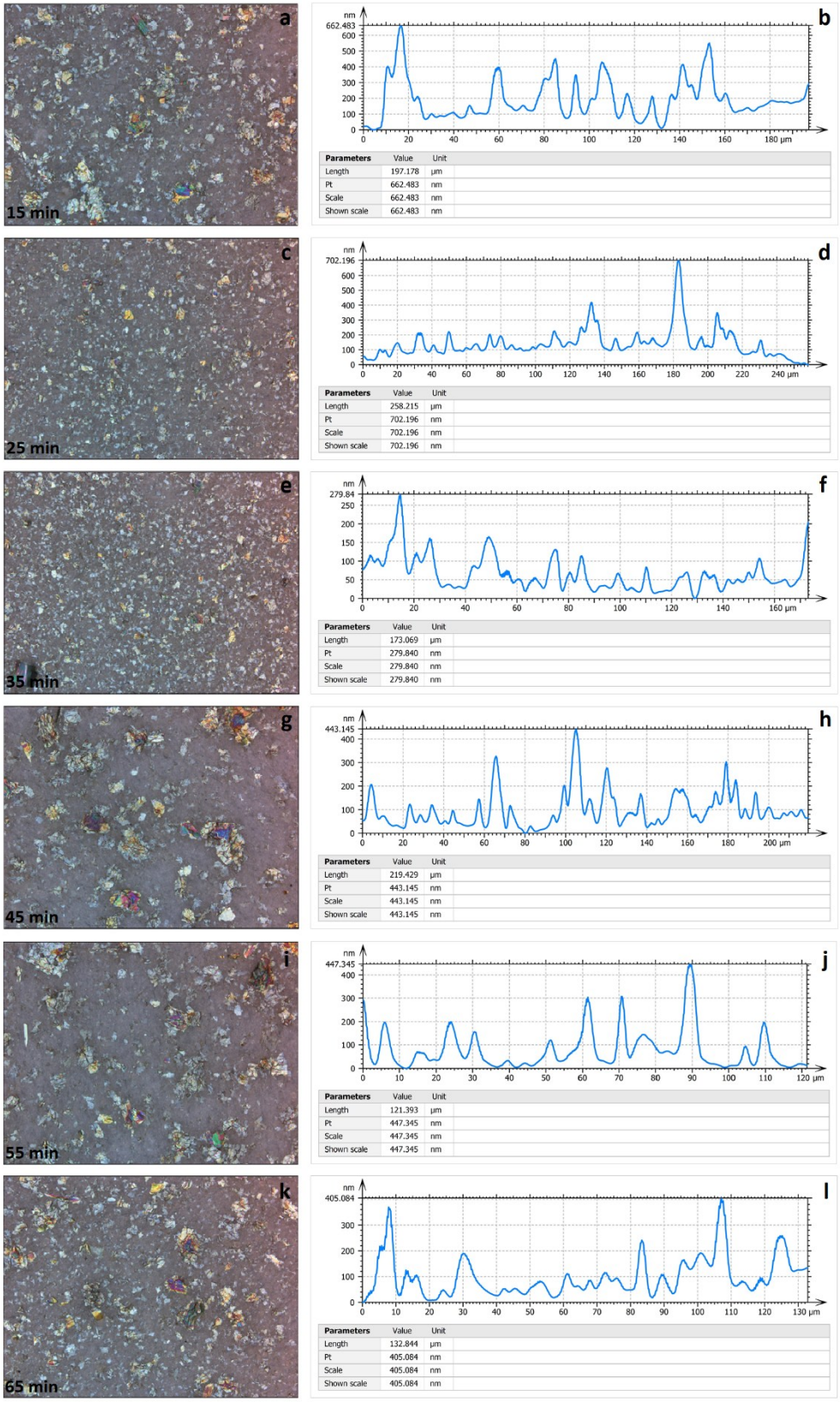

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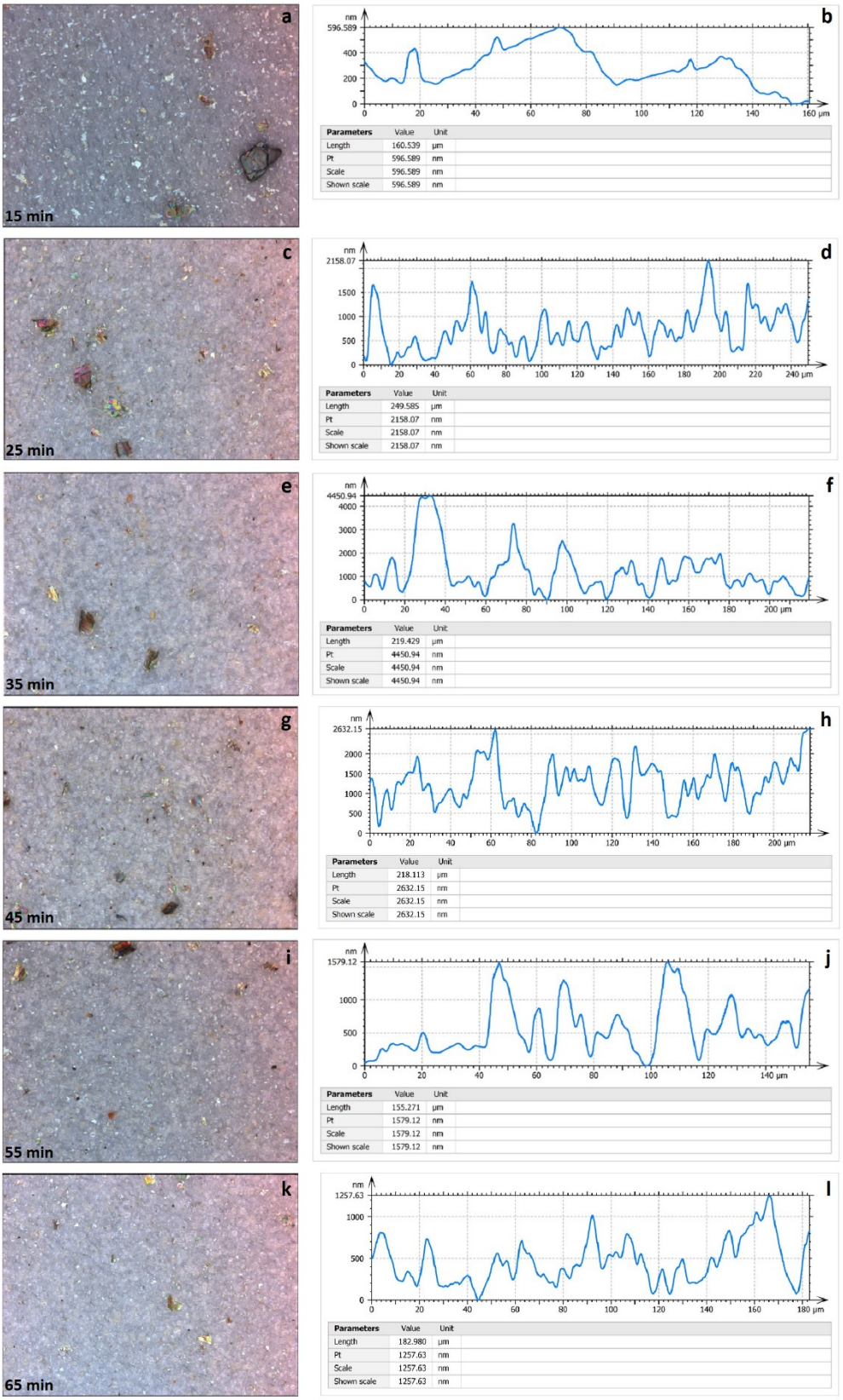

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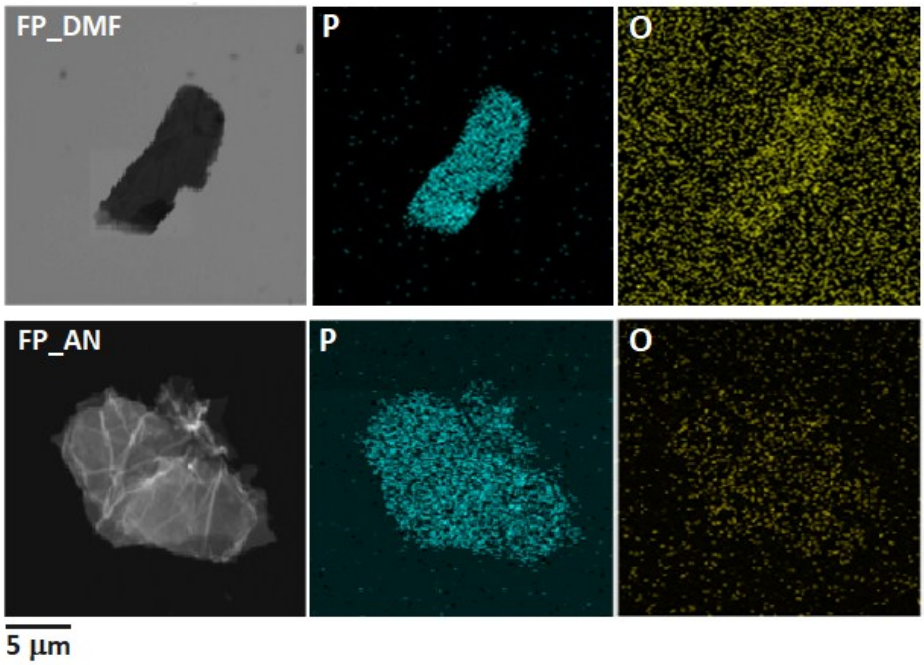

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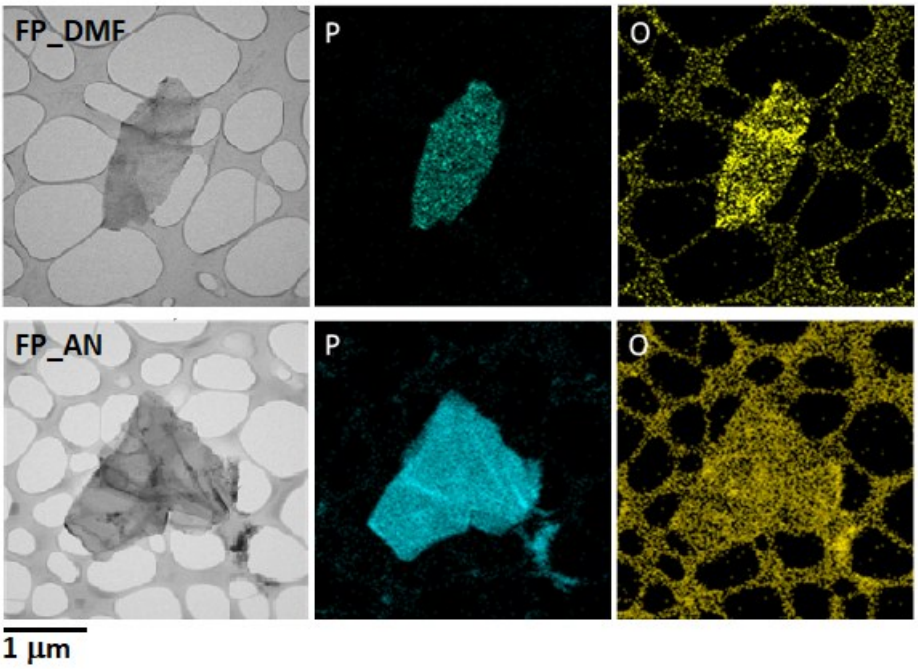

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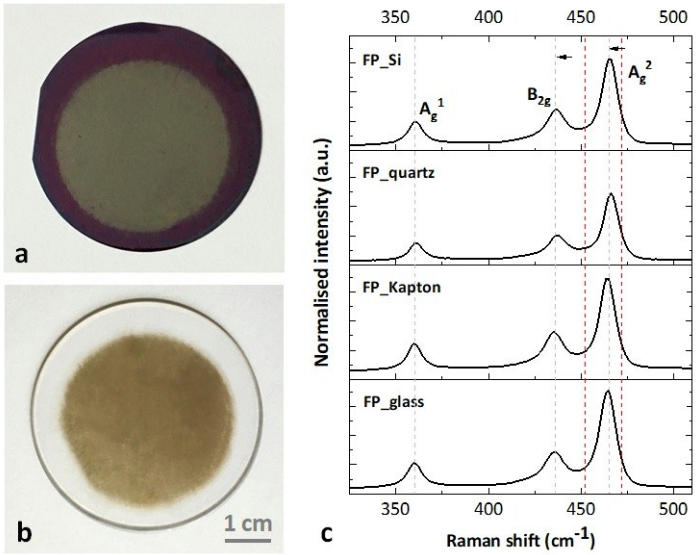

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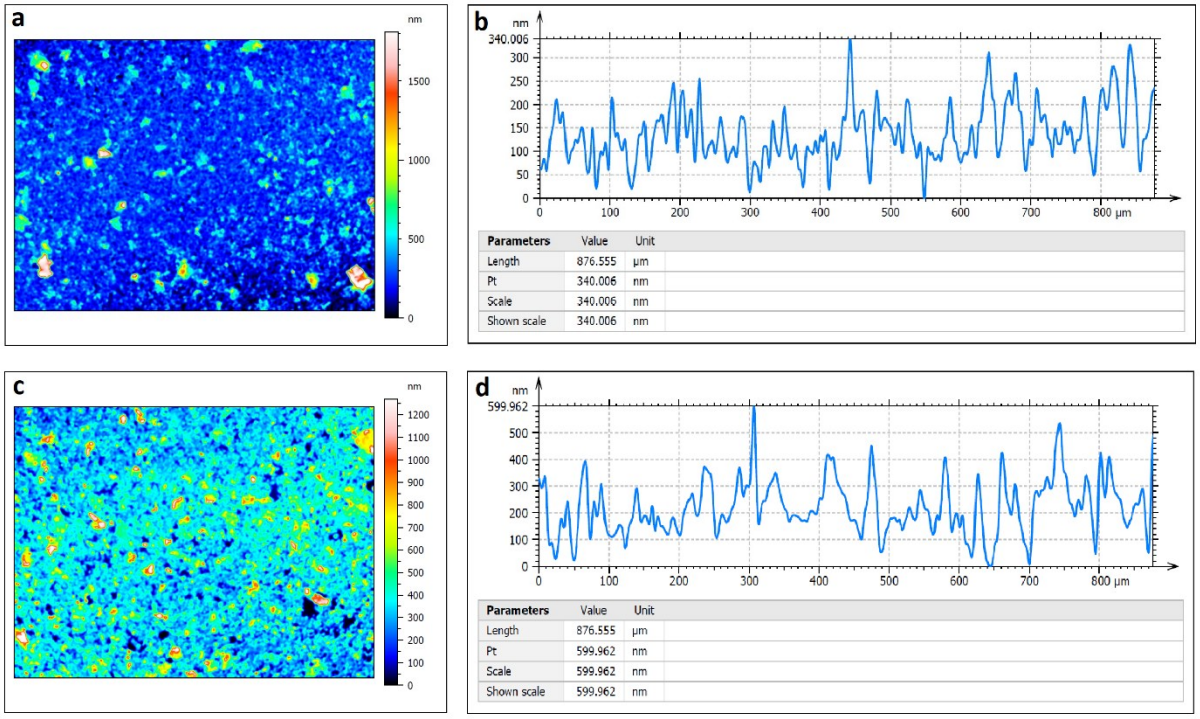

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