Electronic Supplementary Material (ESI) for Nanoscale.

Supporting Information

Ultraporous Nanocrystalline TiO_2-based Films: Synthesis, Patterning and Application as Anti-Reflective, Self-Cleaning, Superhydrophilic Coatings

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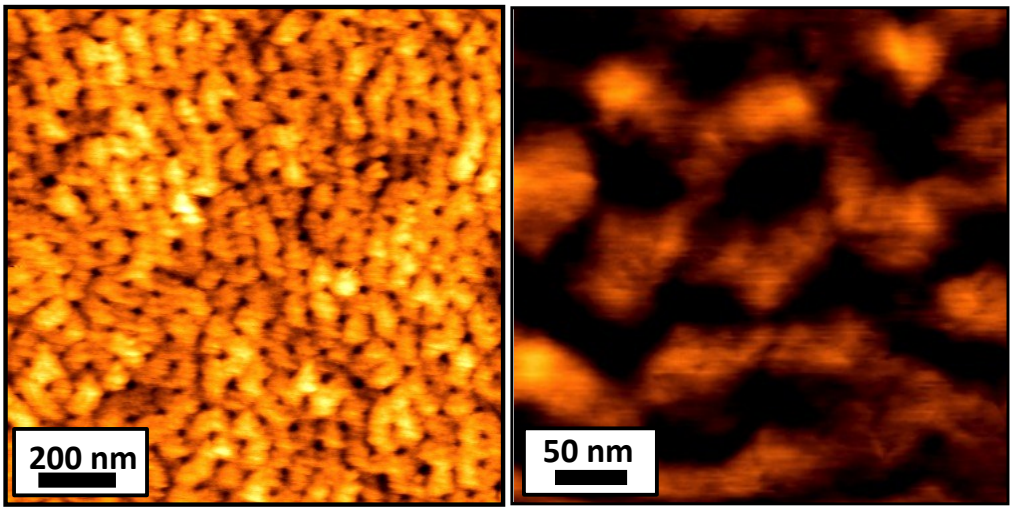

Figure S1 AFM analysis of the ultraporous TiO_2-based layer

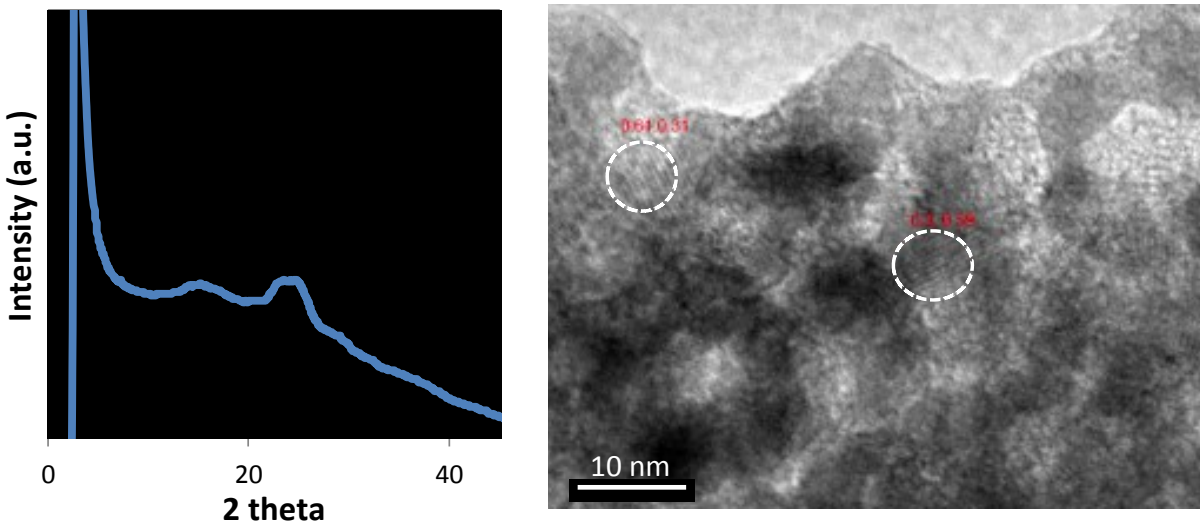

Figure S2: (left) Diffraction diagram obtained after radial integration of the GI-WAXS 2D-pattern collected on the ST-PBF film. The diffraction signal located at 2θ=24.5° corresponds to the (101) reticular plans of the Anatase phase of TiO_2. The signal located at 15° (2θ) could not be attributed to any TiO_2 phase and is likely to be a measurement artefact. (right) HR TEM of the 10%SiO_2 90% TiO_2 porous film. Dotted lines are representing single anatase particles

Figure S3: Contact angle measurement of the ultraporous TiO_2-based before (left) and after (right) water droplet deposition

S4 Experimental calculation of LA filling fraction

The filling fraction of LA into the porosity was evaluated by a 3 components Bruggeman Effective Medium approximation as follows:

$$f_{TiO_2}\frac{\tilde{\varepsilon}_{TiO_2}-\tilde{\varepsilon}}{\tilde{\varepsilon}_{TiO_2}+2\tilde{\varepsilon}}+f_{air}\frac{\tilde{\varepsilon}_{air}-\tilde{\varepsilon}}{\tilde{\varepsilon}_{air}+2\tilde{\varepsilon}}+f_{LA}\frac{\tilde{\varepsilon}_{LA}-\tilde{\varepsilon}}{\tilde{\varepsilon}_{LA}+2\tilde{\varepsilon}}=0$$

were the phase TiO_2 represent the TiO_2-based material (0.9 TiO_2/0.1 SiO_2). Here the 3 phases are not adsorbing in the considered range of the wavelength so that the dielectric constants are the square of the refractive indices. For the polluted films, $f_{air}+f_{LA}$ is equal to the 0,8 (porous volume) while f_{TiO2} is equal to 0,2. Assuming the refractive index values of the TiO_2 -based phase, LA and air being 2.1, 1.42 and 1 respectively, we calculated LA filling fraction of 50±5% of the porosity (41±2% of the full film volume).