Electronic Supplementary Material (ESI) for Environmental Science: Nano.

SUPPLEMENTARY INFORMATION

Antimicrobial Activity of Flame-Synthesized Nano-TiO_2 Coatings

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Raman spectrum of TiO_2 coating – wide spectral range

In order to verify the absence of any carbon contamination originated by the incomplete fuel combustion due to potential local deviation from the ideal flame conditions, the Raman spectrum was measured using a 1200 gr/mm grating to extend the spectral region between 100 cm^{-1} and 2000 cm^{-1}, and it was background subtracted. The spectrum of a t_{des}=30 s TiO_2 coating layer is reported in Figure S1, showing that the typical peaks related to the presence of carbon compounds produced from incomplete combustion, the D band at about 1350 cm^{-1} and the G band at about 1600 cm^{-1}, are not detected.

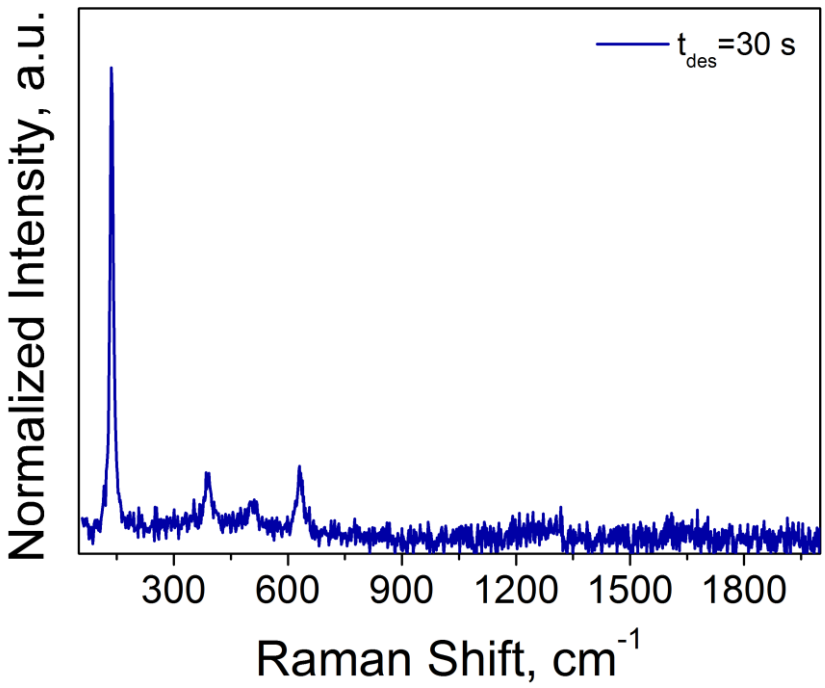

Figure S1. Raman spectra of TiO_2 coating layer t_{des}=30 s in the extended region 100 - 2000 cm^{-1}.

TiO_2 coating stability after washing procedure

The mechanical stability of AFS TiO_2 thin films to the stress produced by the standard washing procedure was verified using the following method. A TiO_2 nanoparticle coating on aluminum substrate was produced with a deposition times t_{des}=30 s. The coated substrate was then washed three times with bi-distilled water and dried in ambient air. Raman spectra in the spectral region 100 cm^{-1} and 800 cm^{-1} were acquired on seven different points of the substrate before the washing procedure and on seven different points of the substrate after the washing procedure. The most intense anatase peak (E_g mode at 144 cm^{-1}) for all the acquired Raman spectra is reported in Figure S2. It is possible to observe that the mean maximum intensity of the peak remains almost constant after substrate washing, showing that the film is characterized by a good stability to the washing procedure.

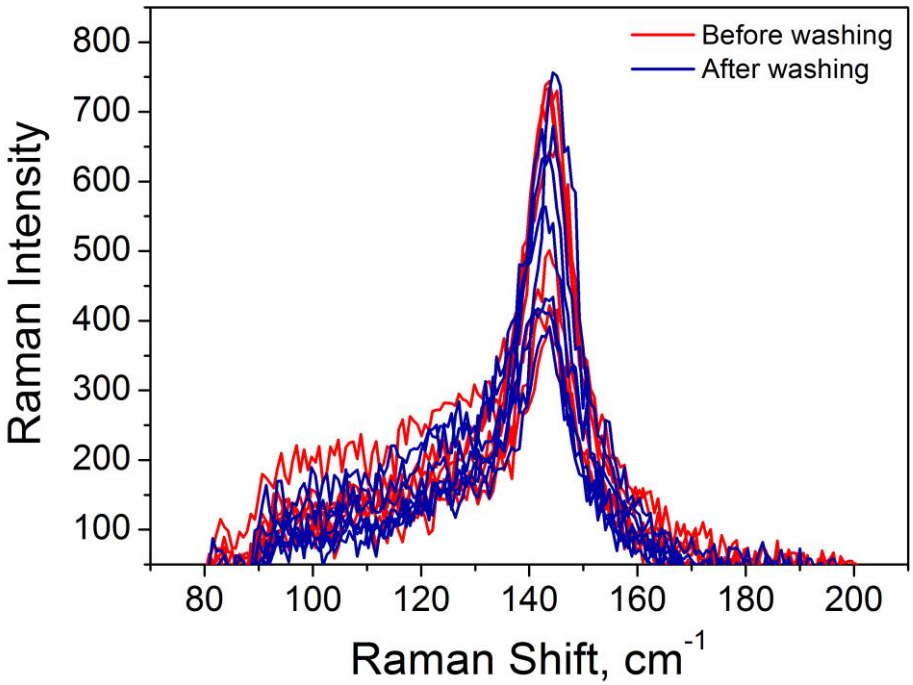

Figure S2. E_g mode Raman peaks of spectra acquired on t_{des}=30 s coating layer before (red lines) and after (blue lines) the washing procedure.

Moreover, the morphology of TiO_2 coating after the washing procedure was analyzed using a Scanning Electron Microscopy Philips XL30. A SEM image acquired over the surface of t_{des}=30 s TiO_2 coating layer washed three times is shown in Figure S3. It is possible to observe that the coating is quite uniform along the substrate surface, presenting the typical fractal-like nanostructured geometry of the nanoparticle assembling, and so the washing procedure does not remove the TiO_2 film.

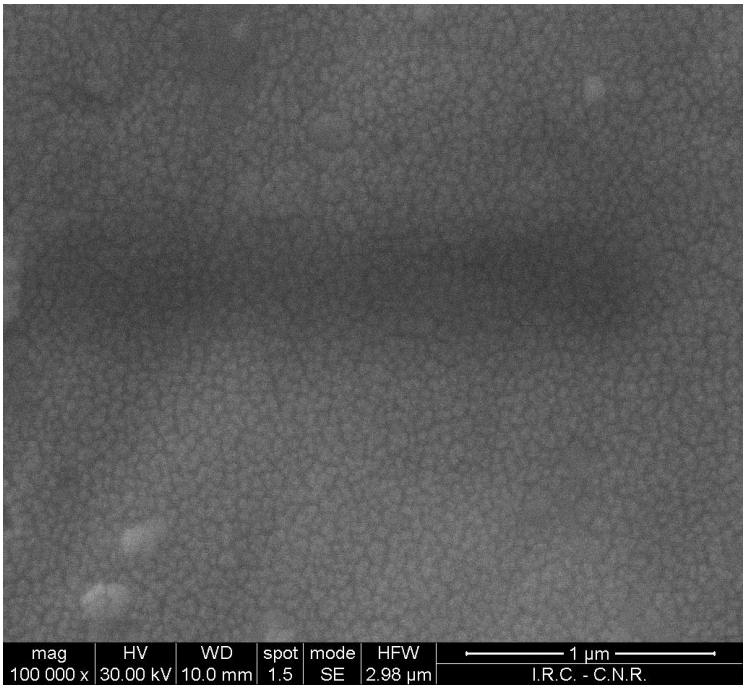

Figure S3. SEM image acquired on t_{des}=30 s coating layer after the washing procedure.