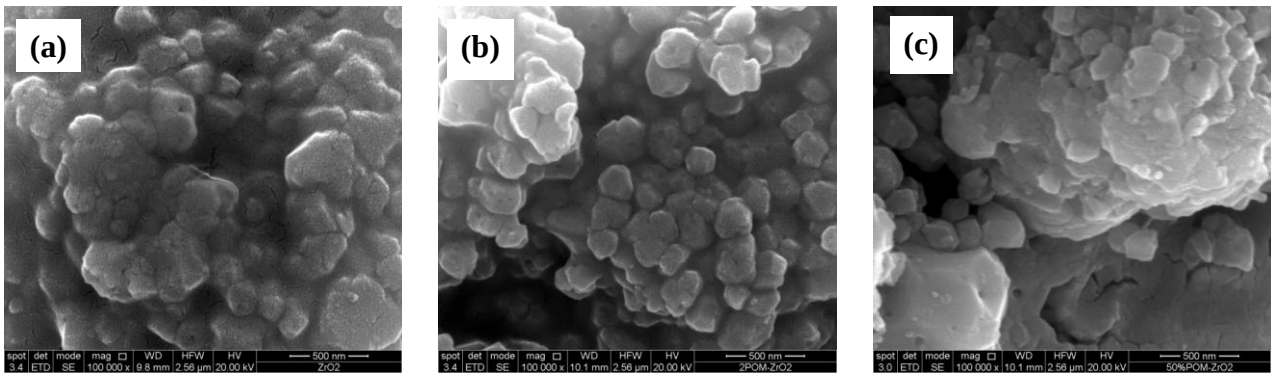
XRD supplementary information.

The particle sizes has been evaluated by means of the Scherrer equation): $\Phi = K\lambda/(\beta \cos \theta)$, where Φ is the crystallite size, λ is the wavelength of the X-ray radiation (0.154 nm), K is usually taken as 0.89, β is the peak width at half maximum height after subtraction of the equipment broadening and $\theta = 12.65°$ for TiO_2 anatase and $\theta = 13.70°$ for TiO_2 rutile. The crystallinity of all the samples was evaluated following the procedure reported by Jensen et al. [1].

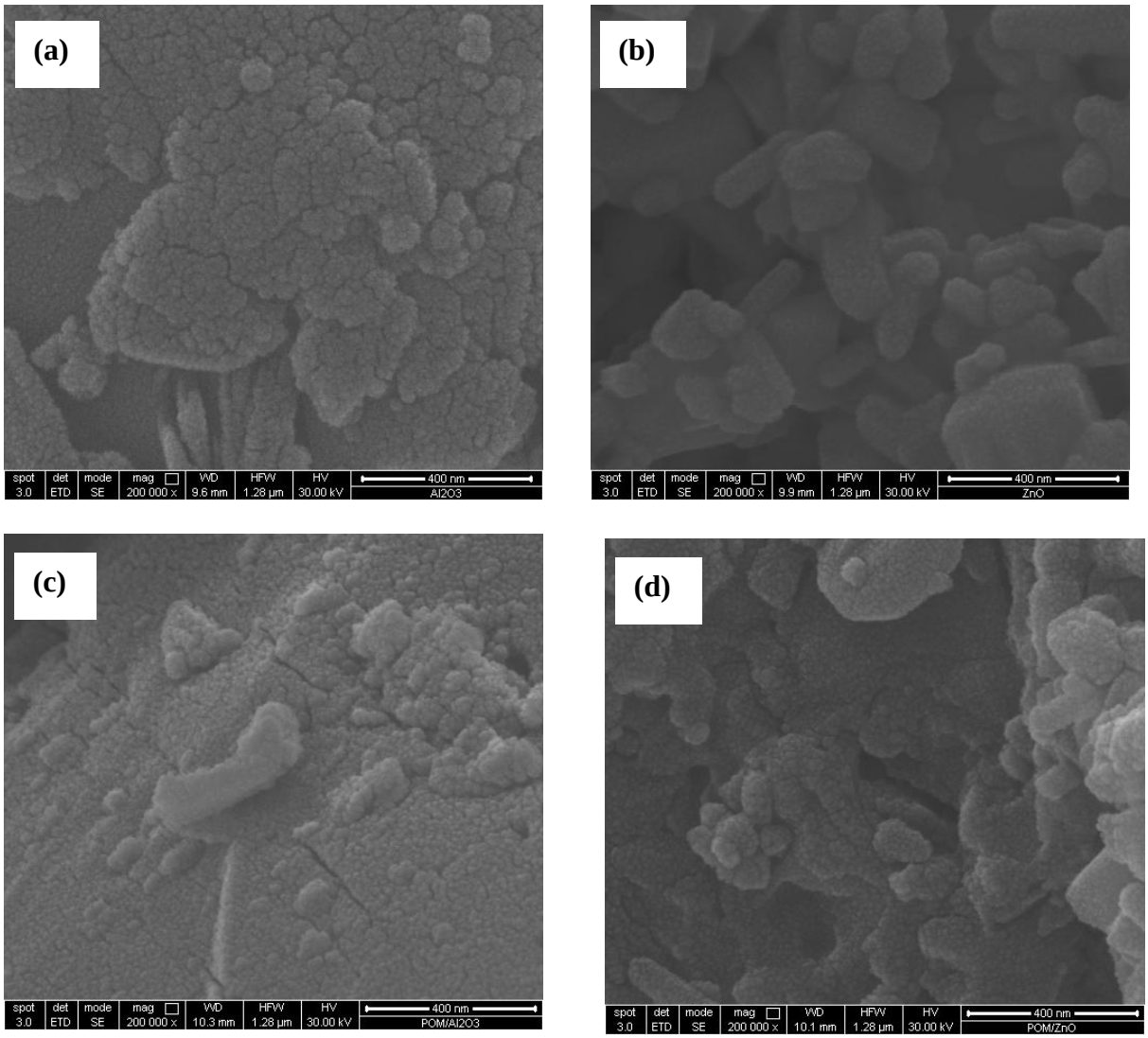
XRD diffractograms were recorded for mixtures of TiO_2 and CaF_2 (50% w/w) and the areas of the 100% peaks of anatase (101), rutile (110) and CaF_2 (220) were determined. By comparing the ratio between the areas of these (101) and (220) and of (110) and (220) peaks with the ratio of the areas of the pure phases (1.25 for anatase and 0.90 for rutile), the amount of crystalline and amorphous phases present in the samples was determined.

The commercial samples are much more cristalline. TiO_2 Evonik P25 showed a rutile phase percentage of 72%, anatase 18% and hence an amorphous phase percentage of 10%, whereas TiO_2 Merck showed a 74% of anatase and 26% of amorphous phase. The home prepared sample showed a 7% of anatase, 5% of rutile and hence an 88% of amorphous phase. The diameter of the crystallites, estimated by means of the Scherrer equation, is in the range 33-54 nm and 18.6-60 nm for rutile and anatase, respectively.

SEM supplementary information.



S. I. Figure 1 . SEM microphotographs for (a) ZrO_2; (b) 2L-POM/ZrO_2; (c) POM/ZrO_2.



S. I. Figure 2. microphotographs for (a) Al_2O_3; (b) ZnO; (c) POM/Al_2O_3; (d) POM/ZnO.

Reference

1. H. Jensen, K.D. Joensen, J.E. Jørgensen, J.S. Pedersen, E.G. Søgaard, *J. Nanopart. Res*., 2004, **6**, 519.