

Supporting Information for “Extreme Structural Stability of $\text{Ti}_{0.5}\text{Sn}_{0.5}\text{O}_2$ Nanoparticles: Synergistic Effect in the Cationic Sublattice”

Denis Machon^{1,2}, Sylvie LeFloch¹, Shashank Mishra³, Stéphane Daniele³, Karine Verlot-Masenelli⁴, Patrick Hermet⁵, Patrice Mélinon¹

1. Univ. Lyon, Université Claude Bernard Lyon 1, CNRS UMR 5306, Institut Lumière-Matière, F-69622 Villeurbanne, France
2. Laboratoire Nanotechnologies et Nanosystèmes (LN2), CNRS UMI-3463, Université de Sherbrooke, Institut Interdisciplinaire d'Innovation Technologique(3IT), Sherbrooke, Québec, Canada
3. IRCELYON, CNRS-UMR 5256, Université Lyon 1, 2 Avenue A. Einstein, 69626 Villeurbanne Cedex, France
4. Univ Lyon, INSA Lyon, UCBL, CNRS, MATEIS, UMR 5510, Villeurbanne, France
5. ICGM, CNRS-UMR 5253, Université de Montpellier, ENSCM, 34090 Montpellier, France

Transmission Electron Microscopy

Batch 1

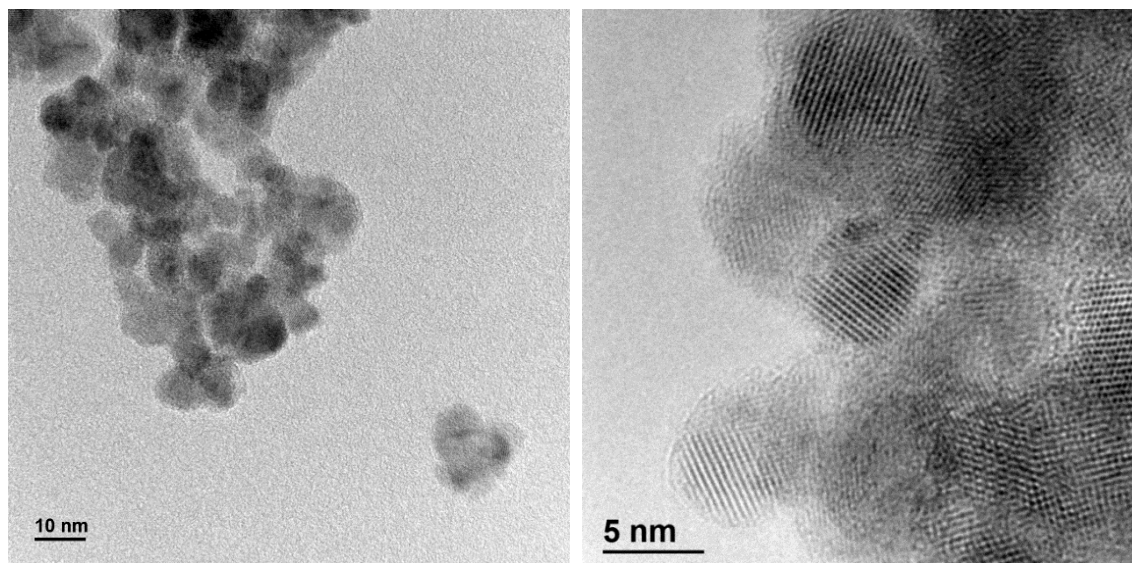


Figure S1 – TEM images of nanoparticles from batch 1

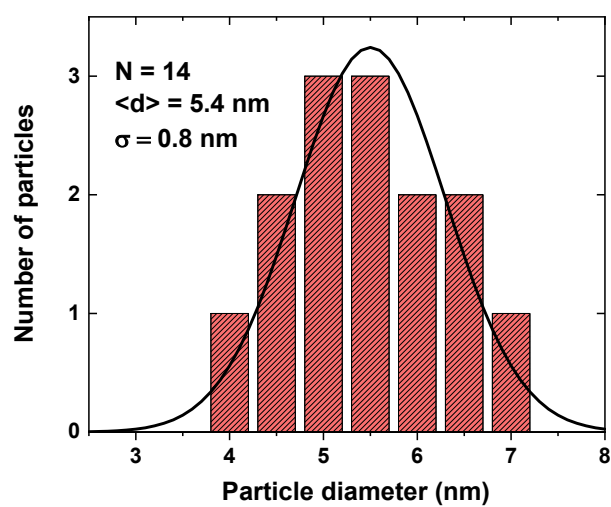


Figure S2 - Distribution of the particles size for Batch 1 from TEM analysis. The fitted parameters of the Gaussian give an approximate size of $5 \pm 1 \text{ nm}$

Batch 2

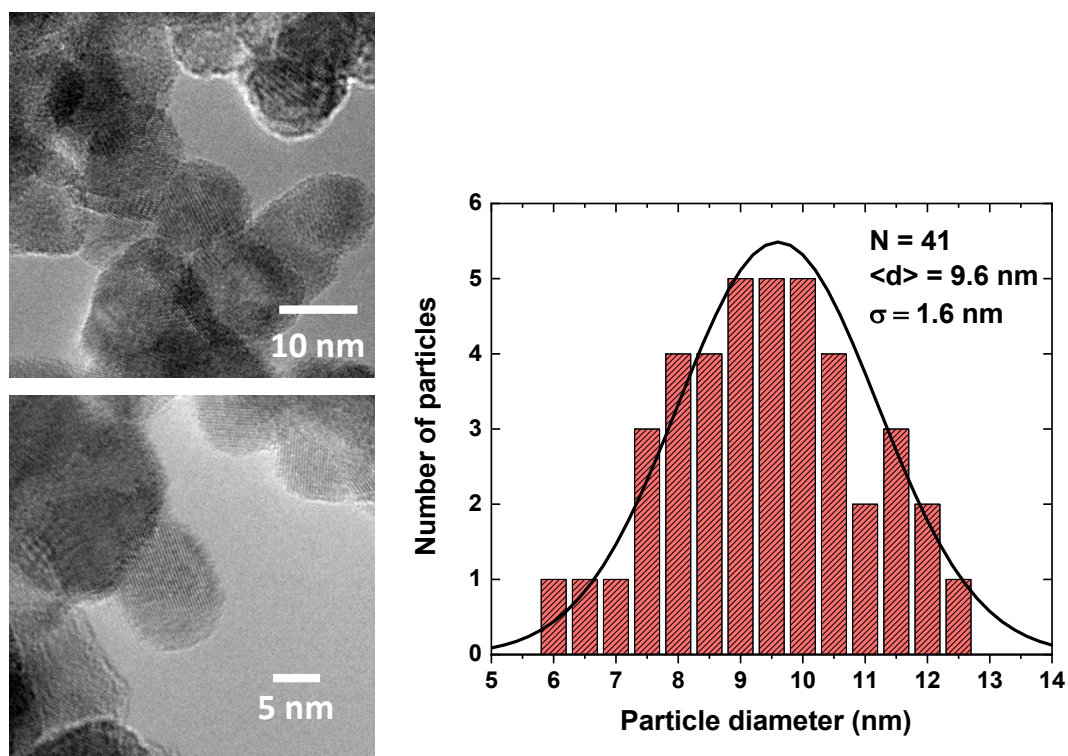


Figure S3 – Typical TEM images and distribution of the particles size for Batch 2 from TEM analysis. The fitted parameters of the Gaussian give an approximate size of $10 \pm 2 \text{ nm}$

Low-frequency Raman spectroscopy

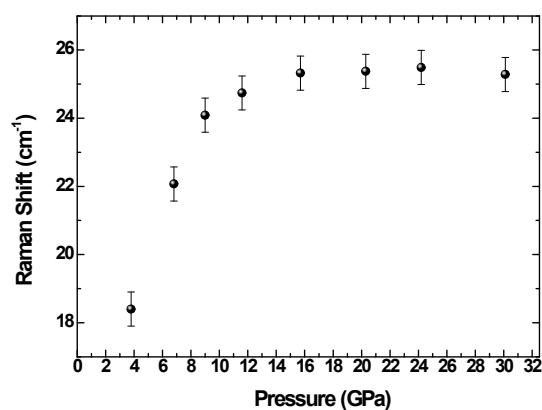


Figure S4 – Low-frequency peak positions as a function of pressure for batch 1 (mean particle size: 5nm)

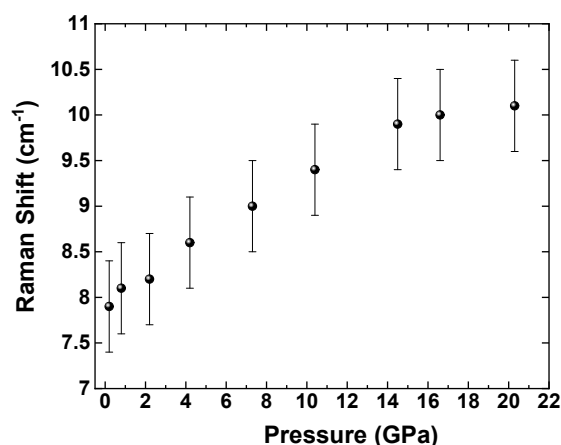


Figure S5 – Low-frequency peak positions as a function of pressure for batch 1 (mean particle size: 5nm)

Raman spectrum after pressure cycle (Batch 2)

Figure S6 compares the Raman spectra of TiO_2 nanorods [1] after a high-pressure cycle (Maximum pressure = 26.5 GPa) with that of $\text{Ti}_{0.5}\text{Sn}_{0.5}\text{O}_2$ nanoparticles (Maximum pressure = 30.1 GPa).

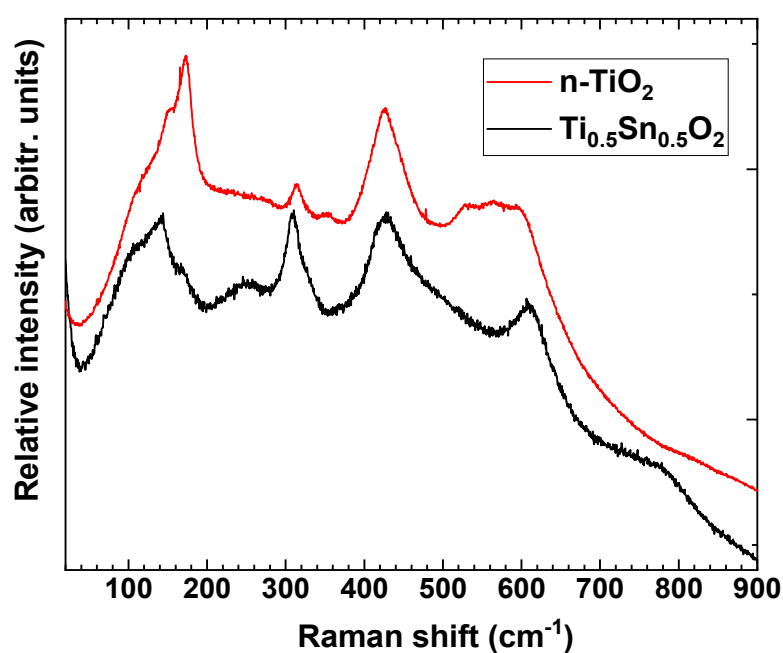


Figure S6 – Comparison of the Raman spectra Raman spectra of TiO_2 nanorods (taken from Ref. [1]) after a high-pressure cycle (Maximum pressure = 26.5 GPa) with that of $\text{Ti}_{0.5}\text{Sn}_{0.5}\text{O}_2$ nanoparticles (Maximum pressure = 30.1 GPa).

1 D. Machon, N. Le Bail, P. Hermet, T. Cornier, S. Daniele, S. Vignoli, J. Phys. Chem. C 123 (3), 1948-1953 (2018)