# A comparison between solution-based synthesis methods of $ZrO_2$ nanomaterials for energy storage applications

M. L. Matias[1], E. Carlos[1*], R. Branquinho[1], H. Valle[1], J. Marcelino[1], M. Morais[1], A. Pimentel[1], J. Rodrigues[2], T. Monteiro[2], E. Fortunato[1], R. Martins[1*], D. Nunes[1*]

*[1]CENIMAT|i3N, Department of Materials Science, School of Science and Technology, NOVA University Lisbon and CEMOP/UNINOVA, 2829-516 Caparica, Portugal*
*[2]Physics Department & I3N, Aveiro University, Campus Universitário de Santiago, 3810-193 Aveiro, Portugal*

## Supplementary information

Figure S1 shows the high-resolution TEM image of the $ZrO_2$ nanoparticles calcinated at 800 ºC for 15 min. The measured lattice spacings of 0.30 and 0.36 nm are in good agreement with the *d*-spacing of the (101) and (100) planes of the tetragonal $ZrO_2$ phase, respectively. The FFT image attested for the presence of tetragonal $ZrO_2$ nanocrystals.

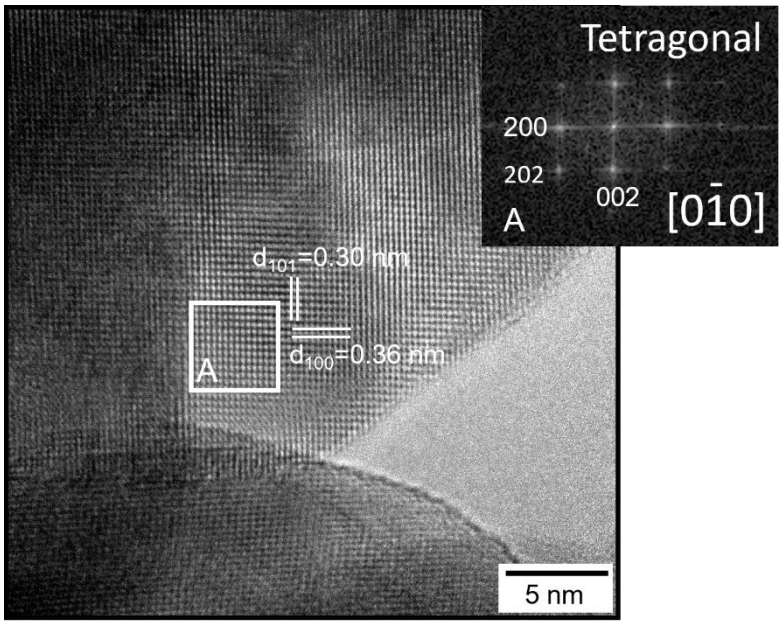


**Figure S1** – High-resolution TEM image of the $ZrO_2$ nanocrystals calcinated at 800 ºC for 15 min. The inset shows the FFT images of the area (black square) indicated as A.

Figure S2 shows the SEM image of a $ZrO_2$ particle produced by the solution combustion synthesis and annealed at 350 ºC. The voids observed can be assigned to the escape of gaseous combustion products that were formed at the time of combustion.

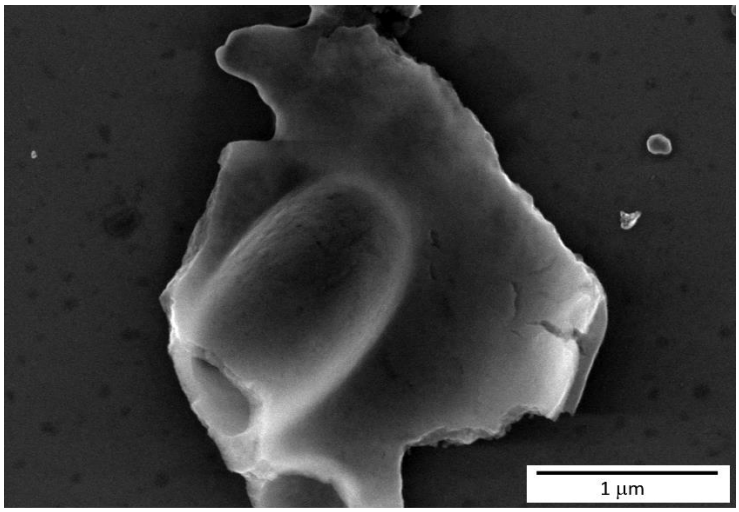


**Figure S2.** SEM image of a $ZrO_2$ particle produced by solution combustion synthesis and annealed at 350 ºC.