Electronic Supplementary Information for

Rapid Preparation of Block Copolymer Templated Mesoporous Zr$_{1-x}$Ce$_x$O$_2$ Thin Films

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Cauchy – Lorentz relationship[1]

Cauchy model describes the optical properties for dielectric materials (Equation 1), which assumes *k=0* meaning no absorption.

$$n(\lambda) = A + \frac{B}{\lambda^2} + \frac{C}{\lambda^4}$$
Eq. 1

where A, B and C are fitting parameters.

In order to include the absorption bands present in the studied materials, Lorentz functions were added to the model description for each absorption peak (Equations 2 and 3).

$$\varepsilon_r = \frac{A\lambda^2(\lambda^2-\lambda_0^2)}{\left(\lambda^2-\lambda_0^2\right)^2+\lambda^2\Gamma^2} = n^2 - k^2$$
Eq. 2

$$\varepsilon_i = \frac{A\lambda^3\Gamma}{\left(\lambda^2-\lambda_0^2\right)^2+\lambda^2\Gamma^2} = 2nk$$
Eq. 3

where A represents the absorption band amplitude, λ_0 the central wavelength, and Γ the full width at half maximum.
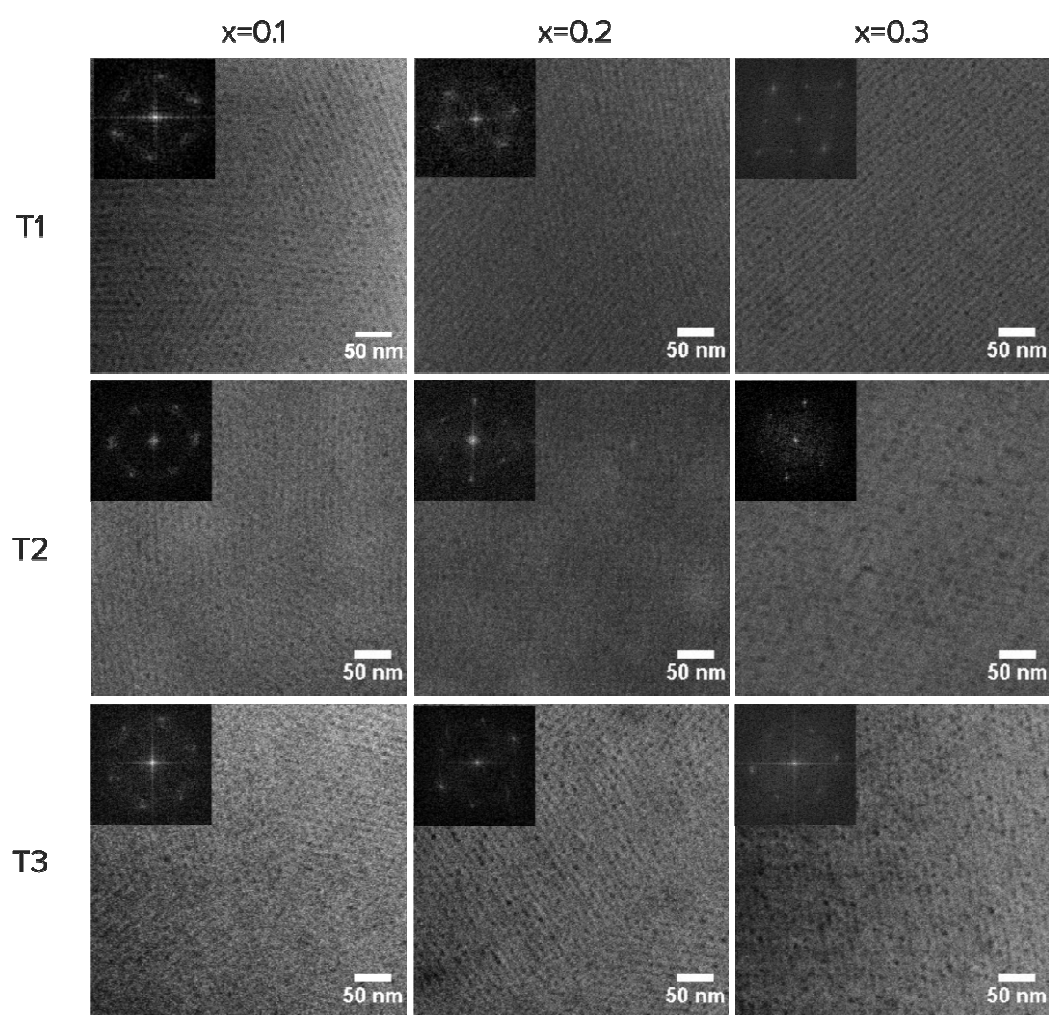
Figure S1. FE-SEM top-view images of $Zr_{1-x}Ce_xO_2$ obtained for different compositions, x = 0.1, 0.2 and 0.3, and through different treatments: *T1, T2* and *T3* (see experimental details). Inset: FFT of the image, showing the high degree of order.
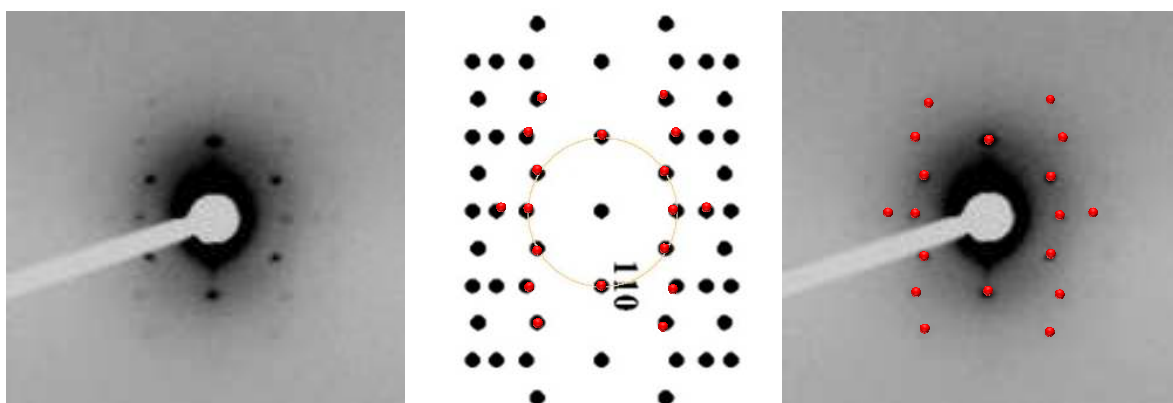
Figure S2. 2D SAXS pattern obtained right after deposition of the sol used to synthesize $Zr_{0.5}Ce_{0.5}O_2$ MPTF, and its comparison with theoretical pattern.[2]
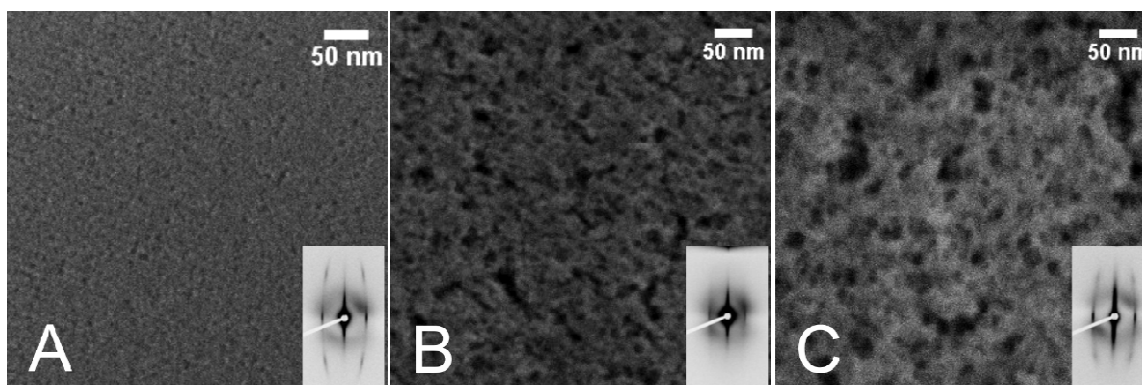

Figure S3. FE-SEM images of $Zr_{0.5}Ce_{0.5}O_2$ MPTF applying different post-treatments. A: *T1*; B: *T2*; C: *T3.* Inset: 2D-SAXS patterns.
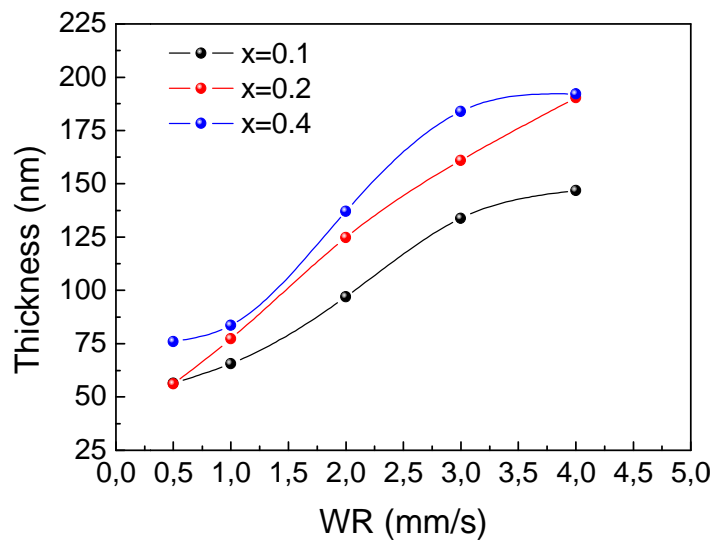
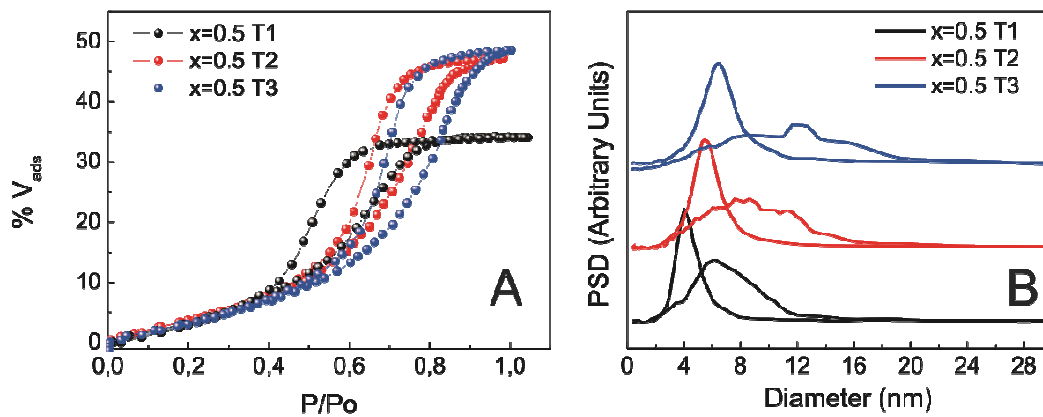**Figure S4.** Mesoporous $Zr_{1-x}Ce_xO_2$ films thickness vs. Withdrawal Rate

Figure S5. EEP isotherms (A) and pore size distributions (B) of $Zr_{0.5}Ce_{0.5}O_2$ MPTF prepared through different thermal treatments.
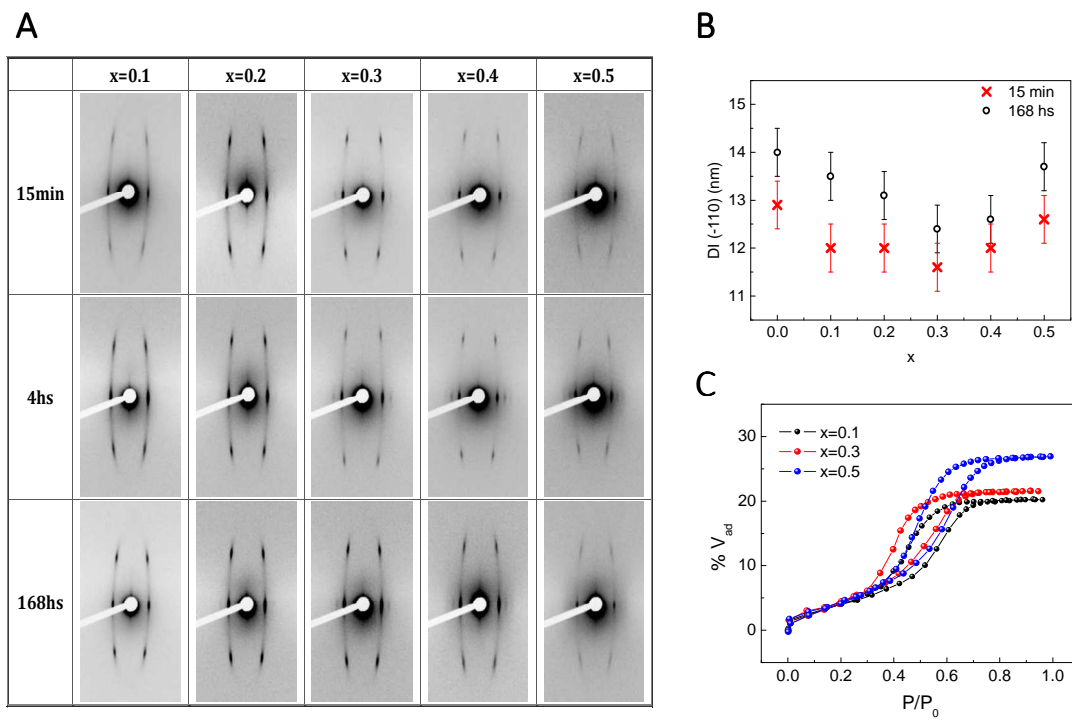
Figure S6. A) 2D SAXS patterns of the MPTF obtained with sols aged for different times. B) Interplanar distance obtained by SAXS for the different MPTF and for two extreme sols aging times. C) EEP water isotherms for MPTF deposited using sols aged for one week.
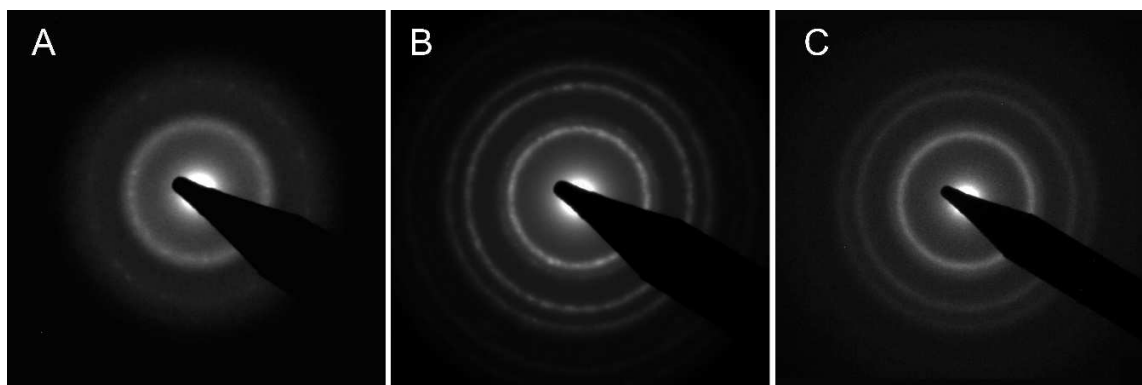

Figure S7. SAED images of $Zr_{0.9}Ce_{0.1}O_2$ calcined at 350ºC (A), 550ºC (B), and $Zr_{0.5}Ce_{0.5}O_2$ MPTF calcined at 550ºC.

1.   Tompkins, H. G.; McGahan, W. A., *Spectroscopic Ellipsometry and Reflectometry. A user´s guide.* Wiley Interscience: 1999.

2.   Tate, M. P.; Urade, V. N.; Kowalski, J. D.; Wei, T.-c.; Hamilton, B. D.; Eggiman, B. W.; Hillhouse, H. W. *Journal of Physical Chemistry B* **2006,** 110, (20), 9882-9892.