

MS16. Physical properties through lattice distortions: structure of perovskites & Co studied by electron microscopy and diffraction

[3] C. Suchomski, C. Reitz, D. Pajic, Z. Jaglicic, I. Djerdj, T. Brezesinski, *Chem. Mater.*, 2014, 26, 2337.

[4] C. Reitz, P. M. Leufke, H. Hahn, T. Brezesinski, *Chem. Mater.*, 2014, 26, 2195.

[5] C. Reitz, P. M. Leufke, R. Schneider, H. Hahn, T. Brezesinski, *Chem. Mater.*, 2014, 26, 5745.

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MS16-O1 Synthesis and structure-property relationships of polymer-templated mesoporous mixed-metal oxide thin films

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In recent years, much attention has been devoted to solution-processed mesostructured metal oxide thin films with cubic and hexagonal pore symmetries. The primary reasons for this are their capability to outperform conventional bulk materials and the unprecedented properties because of the high surface-to-volume ratio resulting from the porous structure. Advances in polymer (“soft”) templating have enabled the preparation of many important non-silicate mesostructured oxide thin films with different ordering lengths [1]. Their formation relies on the solution-phase coassembly of molecular inorganic building blocks with an amphiphilic polymer structure-directing agent (SDA) using an EISA process [2]. Despite the progress made over recent years, the synthesis of mixed-metal oxides remains challenging, mainly due to the difficulty of controlling the thermally induced crystallization. This process is often associated with the loss of nanoscale porosity and periodicity because of the mismatch between the stable grain size and pore wall thickness. In this talk, I will focus on the templating synthesis (and structure-property relationships) of some selected mixed-metal oxide thin films (perovskite-type $\text{PbZr}_{1-x}\text{Ti}_x\text{O}_3$, $\text{La}_{1-x}\text{A}_x\text{MnO}_3$, etc.) with both an ordered cubic network of ~ 20 nm pores and highly crystalline walls by using large poly(ethylene-co-butylene)-block-poly(ethylene oxide) and polyisobutylene-block-poly(ethylene oxide) diblock copolymer SDAs [3-5]. I will show that the integration of nanoscale porosity with texture-specific properties paves the way to broaden the scope of application of these materials.

[1] C. Sanchez, C. Boissiere, D. Grosso, C. Laberty, L. Nicole, *Chem. Mater.*, 2008, 20, 682.

[2] C. J. Brinker, Y. F. Lu, A. Sellinger, H. Y. Fan, *Adv. Mater.*, 1999, 11, 579.