

Seminar Fizičkog odsjeka

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Mjesto

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Mesostructured Metal Oxide Thin Films with Cubic Pore Symmetry and Ferroic Properties

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Metal oxide thin films with both a mesoporous morphology and a highly crystalline wall structure have received significant attention over the past several years. This is due, in part, to the fact that many such materials have been shown to be able to outperform their bulk counterparts, which is particularly evident in the forefront fields of energy storage, catalysis, and information technology.

Advances in polymer templating of inorganic materials have enabled the preparation of a variety of mesoporous metal oxides with different pore structures [1], including cubic and 2D-hexagonal. Their formation relies on the solution-phase coassembly of inorganic building blocks with an amphiphilic polymer structure-directing agent using an evaporation-induced self-assembly (EISA) process to achieve long-range periodicities reminiscent of lyotropic liquid crystal phases [2]. However, despite the progress made, many polymer-templated materials described in the literature exhibit an ill-defined porosity after crystallization. Part of the reason for this is the difficulty of controlling the amorphous-to-crystalline conversion at elevated temperatures while retaining nanoscale structure.

In this talk, I specifically focus on ferroic metal oxide thin films - including LSMO and PZT - materials that can be readily produced with a cubic network of large pores by utilizing tailor-made poly(ethylene-co-butylene)-*block*-poly(ethylene oxide) and polyisobutylene-*block*-poly(ethylene oxide) diblock copolymers as structure-directing agents [3-6]. Such materials might offer the possibility to develop novel “nano-enabled” device design.

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

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

[3] C. Reitz, J. Haetge, C. Suchomski, and T. Brezesinski, *Chem. Mater.* DOI: 10.1021/cm402995a (2013).

[4] C. Reitz, C. Suchomski, J. Haetge, T. Leichtweiss, Z. Jaglicic, I. Djerdj, and T. Brezesinski, *Chem. Commun.* 48, 4471 (2012).

[5] C. Reitz, C. Suchomski, V. S. K. Chakravadhanula, I. Djerdj, Z. Jaglicic, and T. Brezesinski, *Inorg. Chem.* 52, 3744 (2013).

[6] C. Suchomski, C. Reitz, C. T. Sousa, J. P. Araujo, and T. Brezesinski, *Chem. Mater.* 25, 2528 (2013).

Voditelj seminar FO

Damir Pajić i Ivica Smolić