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Rapid Microwave Synthesis of Perovskite Oxide Nanostructures with Enhanced Functionality GREGORY SALAZAR, ANUJA DATTA, Florida Cluster for Advanced Smart Sensor Technologies and Department of Physics, University of South Florida, PRITISH MUKHERJEE, Center for Integrated Functional Materials and Department of Physics, University of South Florida — Perovskite oxides are an important class of materials having high dielectric and piezoelectric coefficients, switchable ferroelectric (FE) polarization and interesting optical and electrical properties. Realization of functional devices based on classic perovskite oxides such as $Pb(Zr_{0.52}Ti_{0.48})O_3$ (PZT), and emerging Pb-free noncentrosymmetric (NCS) oxides, such as, $ZnSnO_3$, $ZnTiO_3$ and $CaTiO_3$ have reinforced the investigation of these materials in multiple dimensions and length scales. However, large-scale synthesis and integration of ordered low-dimensional structures is a challenge, due to their complicated methodologies, high-cost and difficulties with phase stability. We discuss a generalized, cost-effective, rapid microwave synthesis route for size and shape selective nanostructure growth of these functional perovskite oxides on industrially viable flexible and hard substrates, stabilized by an enhanced ionic covalence. The rational synthesis approach allowed improved tunability of the size, shape, and orientation of the structures with improved electrical and FE properties. The facile fabrication route of these nanostructures may expand the outreach of probes for understanding the structure-property relationships in these hitherto unexplored and technologically important materials.

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