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Hybrid semiconductor-ferroelectric and metal-ferroelectric nanostructures[1]

JONATHAN SPANIER, Department of Materials Science & Engineering, Drexel University, Philadelphia PA 19104

The reduction of scale and dimensionality of ferroelectric materials enables study and application of important size-dependent differences in the mechanism for ferroelectric stability. These scale and dimensionality reductions also facilitate new opportunities for integrating ferroics with other material systems for multi-functional nano-scaled devices. First, we review our recent progress in understanding ferroelectric stability and the finite size-dependent evolution of the ferroelectric phase transition temperature in single-component nanostructures and its implications. We present results of a versatile synthetic approach we have developed to produce multi-component nanostructures, with examples of semiconductor-ferroelectric and metal-ferroelectric hybrid nanostructures. We discuss characterizations of their component structure and composition, and we also present the results of measurements of the properties of these hybrid nanostructures as individually and electrically addressable device elements.

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