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Probing Confinement and Interfacial Effects on Multilayer Ferroelectric Polymer Thin Films JENNIFER JONES, Vanderbilt Universtiy, ANTHONY MAYO, Fisk University, LEI ZHU, Case Western Reserve University, NORMAN TOLK, Vanderbilt Universtiy, EUGENE COLLINS, RICHARD MU, Fisk University — Electrical energy storage plays a key role in mobile electronic devices, stationary power systems, and hybrid electrical vehicles. High energy density capacitors based on dielectric polymers are a focus of increasing research effort motivated by the possibility to realize compact and flexible energy storage devices. Multilayered ferroelectric PVDF systems are fabricated using enabling technology in co-extrusion for increased energy storage efficiency. These micro- and nano-layered polymeric systems result in much improved device performance and a three-time enhancement of capacitive electrical energy density has been demonstrated. To understand the physics of why these multilayered systems perform better than a single layer we are developing characterization techniques using confocal second harmonic generation (SHG), electric field induced second harmonic (EFISH) and Raman laser spectroscopy. Our results have shown that the combination of Raman and SHG is a very sensitive, non-destructive and versatile technique that can be used to study the ferroelectric and structural properties of layered systems. The addition of EFISH this technique allows the interrogation of structural and dielectric properties within the individual layers and at the interfaces between the layers.

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