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**Scanning Probe Microscopy and Microwave Characterization of Nanostructured Ferroelectric Barium Strontium Titanate Thin-Films Fabricated by Pulsed Laser Deposition** ANGELA CAMPBELL, AFRL, Materials and Manufacturing Directorate, WPAFB, OH 45433, GURU SUBRAMANYAM, Dept. of ECE, University of Dayton, RAND BIGGERS, AFRL, Materials and Manufacturing Directorate, WPAFB, OH 45433, BONNIE RIEHL, Dept. of ECE, University of Dayton — A series of nanostructured ferroelectric thin-films of barium strontium titanate were fabricated using a pulsed laser deposition system with real-time in-situ process control. Pulsed laser deposition parameters were optimized for growth of tunable, low-loss nanostructured thin-films for use in the development of high frequency tunable microwave devices. Thin-films were grown at identical temperatures and energy densities as oxygen ambient pressures were varied from 19 mT through 1 T. Structural and electrical characterization were performed using contact-mode AFM and surface potential imaging. Microwave characterization was performed using coplanar waveguide lines and resonators to characterize the frequency dependent dielectric properties ($\varepsilon_r$ and tan $\delta$). Contact-mode AFM showed an increase in grain size with increase in oxygen ambient pressure from 38-75 mT. Surface potential imaging demonstrated that X patterns written by applying a voltage to thin-films with an AFM tip in contact mode are electrically switchable. Microwave characterization showed that thin-films grown at 75mT oxygen partial pressure yielded the most stable films in terms of tunability and loss-tangent over a wide frequency range.

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