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Characterization of patterns produced by AFM Nano-Lithography on thin films of Lanthanum Barium Manganese Oxide, $\mathbf{La_{0.7}Ba_{0.3}MnO_3}$ E. KEVIN TANYI, PARUL SRIVASTAVA, CHRISTOPHER STUMPF, KEVIN SCHENNING, TYLER GOEHRINGER, RAJESWARI KOLAGANI, DAVID SCHAEFER, Towson University — AFM Nano-lithography is a process that uses a bias voltage between the tip of an atomic force microscope (AFM) and a sample placed beneath the tip, to produce patterns on the sample through electro-chemically induced surface modification. AFM nanolithography has been demonstrated on Silicon as well as on thin films of several perovskite metal oxides. Most of the previous research in AFM nanolithography on thin films has focused on the effects of humidity, tip voltage, contact force and the scan rate on the nanolithography processes. Little attention has been paid to the possible role of substrates on which these films have been grown. We have observed that the substrate characteristics (type of substrate, substrate thickness and surface termination) have an impact on the characteristics of the patterns produced by AFM nanolithography. In this work, we present nanolithography studies on (100) SrTiO3 (alias STO) and (100) silicon substrates before and after the deposition of thin films of $La_{0.7}Ba_{0.3}MnO_3$ (LBMO). The characteristics of the patterns produced will be discussed in an effort to fully understand how the patterns depend on sample thickness (substrate or film), sample composition (STO, Si, LBMO), voltage and scan rate. Analysis of these results is expected to shed light on the chemical and physical changes responsible for AFM nanolithography.

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