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Atomic manipulation with Scanning Tunneling Microscopy on the surface of a manganite thin film RAMA VASUDEVAN, ALEXANDER TSELEV, ARTHUR BADDORF, SERGEI KALININ, Oak Ridge National Laboratory — Manganites have attracted significant attention in the past two decades, due to an extraordinarily rich spectrum of phenomena stemming from inherent complexity linking spin, charge, lattice and orbital degrees of freedom that result in properties including half-metallicity and giant magnetoresistance. Here, we report atomic manipulation with STM on the surfaces of 25 unit-cell thick La5/8Ca3/8MnO3 (LCMO) SrTiO3 (STO) substrates. We demonstrate that by applying triangular first-order reversal curve (FORC) waveforms of increasing amplitude to STM tips in-situ, it is possible from both A and B terminations to individually extract single units, form vacancies, remove units from layers below, rearrange atoms in the surrounding lattice, and therefore cause reactions to occur at the atomic level. These experiments point to the possibility of STM to manipulate atoms on the surfaces of manganites, opening up further avenues of research into fundamental physical properties defined at atomic scales. This research was sponsored by the Division of Materials Sciences and Engineering (RKV, AT, SVK) and by the Scientific User Facilities Division (APB) of BES, DOE. Research was conducted at the CNMS, which is sponsored at ORNL by the Scientific User Facilities Division, BES, DOE.

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