Title:	Electrical domain writing and nanoscale potential modulation on LaVO3/SrTiO3
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Abstract:	The high-mobility 2 dimensional electron gases formed at the interfaces between certain insulating perovskite oxides have known to be a playground of exotic physical orders like superconductivity and ferromagnetism and their inter-coupling. There have been efforts to accomplish electronic confinement at such interfaces of oxide heterostructures through nano-structuring of the surface. In this paper, we report writing and erasing charge domains on such an oxide heterostructure LaVO3/SrTiO3 using a conductive AFM cantilever. We have patterned these domains in a periodic fashion in order to create artificial lattices on the surface. Through kelvin probe microscopy, electrostatic force microscopy, and conductivity mapping of such artificial lattices, we found that the domains not only trap charge carriers but also develop a controllable potential landscape on the surface which coincides with a modulation of local electrical conductivity. The ability to pattern such nanostructures reversibly offers unprecedented opportunities of realizing ultra-high storage density devices in high mobility oxide heterostructures. G.S. would like to acknowledge partial financial support from a research grant of a Ramanujan Fellowship awarded by the Department of Science and Technology (DST), Government of India under Grant No. SR/S2/RJN-99/2011 and a research grant from DST-Nanomission under Grant No. SR/NM/NS-1249/2013. M.B. thanks DST-Nanomission for the JRF position. S.C. acknowledges the financial support of DST Nano Mission project number (SR/NM/NS-1007/2015). N.W. and S.C. acknowledge the financial support of Funding Program for World-Leading Innovative R&D on Science and Technology (FIRST) of the Japan Society for the Promotion of Science (JSPS) initiated by the Council for Science and Technology Policy, by JSPS Grants-in Aid for Scientific Research, No. 24226002.
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