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Pressure-induced modification of colossal magnetoresistive magnanites PETRO MAKSYMOVYCH, S. KELLY, R. VASUDEVAN, Center for Nanophase Materials Sciences, Oak Ridge National Laboratory, E. ELISEEV, Institute for Problems of Materials Science, National Academy of Science of Ukraine, A. MOROZOVSKA, Institute of Physics, National Academy of Science of Ukraine, M.D. BIEGALSKI, Center for Nanophase Materials Sciences, Oak Ridge National Laboratory, J.F. MITCHELL, H. ZHENG, Materials Science Division, Argonne National Laboratory, J. AARTS, Leiden Institute of Physics, Leiden University, Netherlands, S.V. KALININ, Center for Nanophase Materials Sciences, Oak Ridge National Laboratory — Nanoscale chemical control of oxides using confined fields, conceptually similar to electrical switching of ferroelectrics, is not obvious. We investigated CMR manganites using UHV force microscopy and tunneling microscopy. Scanning the surface with a metal tip was found to create a strongly insulating state, at least a few nm deep, even at zero applied bias. The state could be due to charge order, polaron disorder, chemical disorder or a combination thereof. Based on concomitant changes of surface potential we propose that contact-pressure modifies electrochemical potential of oxygen vacancies via the Vegard effect, causing vacancy motion and changes of electronic properties. Given broad similarities in defect chemistry, mechanical control of oxides may be universal. (MD) supported by Center for Nanophase Materials Sciences, a DOE Office of Science User Facility. (PM, SVK, RV, JFM, HZ) supported by U.S. DOE Office of Basic Energy Sciences, Division of Materials Sciences and Engineering. [1] Nanotechnology 25 (2014) 475302.

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