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Theoretical studies on the stability of metal-insulator coexistence in the absence of defects in perovskite manganites[1] KEUN HYUK AHN, TSEZAR SEMAN[2], Department of Physics, New Jersey Institute of Technology, Newark, New Jersey 07102, USA, TURAB LOOKMAN, ALAN R. BISHOP, Theoretical Division, Los Alamos National Laboratory, Los Alamos, New Mexico 87545, USA — We examine the stability of large metal-insulator domains in perovskite manganites in the absence of defects, using a model expressed in terms of symmetrized atomic-scale lattice distortion modes. Our results demonstrate that an intrinsic mechanism is responsible for the inhomogeneities in perovskite manganites, which involves long-range interactions between strain fields, the Peierls-Nabarro energy barrier, and complex energy landscapes with multiple metastable states. This is in contrast to an extrinsic mechanism such as chemical randomness or defects. We highlight experimental results which support the intrinsic mechanism rather than the extrinsic mechanism.

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