

Dynamical Reordering of Charge Stripes in (Bi,Ca)MnO₃ Manganites*

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Under the irradiation of a high energy electron beam in a transmission electron microscope, we find that the charge ordering in (Bi,Ca)MnO₃ is first destroyed and then dynamically reordered with a further increase of the electron beam intensity. This electron beam-induced melting and reentrant behavior of charge ordering are found to be a reversible process as a function of the beam intensity. The non-equilibrium behaviors occur as a result of the dynamical reordering as the external drive intensifies. Our finding resembles the dynamics of driven elastic media in the presence of quenched disorder and an external applied drive such as the dynamic reordering of a vortex lattice in superconductors driven by an external force. The energetics of the electron beam-induced effect is understood in the frame work of lifetime of the charge disordered clusters induced by the external irradiation.

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