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Charge Separation and Pre-percolation Regime in Manganites

ZSOLT MARTON, University of Pennsylvania, TAKESHI EGAMI, University of Tennessee/Oak Ridge National Laboratory, RINAT MAMIN, Zavoisky Physical-Technical Institute of RAS, Kazan 420029, Russia, ZAVOISKY PHYSICAL-TECHNICAL INSTITUTE OF RAS COLLABORATION — Complex manganites have been intensively studied in the last decade since they are model objects for investigations of the colossal magnetoresistance. Temperature dependence of $\text{La}_{0.875}\text{Sr}_{0.125}\text{MnO}_3$ single crystals' dielectric and magnetic properties are investigated in the wide range of temperature and external magnetic field. In order to clarify the nature of the charge, spin and orbital ordering as well as the nanoscale inhomogeneity dynamics, we studied their low-frequency capacitances. It is found that giant dielectric permittivity arises in this manganite. The origin of this enormous dielectric response is believed to be connected with the fact that in the pre-percolation regime of charge separation there are very thin regions of insulator phase with large net surface embedded in metallic matrix. The features of the temperature and field dependence of these dielectric properties are explained by the nanoscale dynamic inhomogeneities appearing due to charge and spin ordering.

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