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Polar Nanodomains and Giant Converse Magnetoelectric Effect in Charge-Ordered Fe_2OBO_3 HUAIXIN YANG, HUANFANG TIAN, YUANJUN SONG, YUANBIN QIN, Institute of Physics, Chinese Academy of Sciences, YONGGANG ZHAO, Department of Physics, Tsinghua University, CHAO MA, JIANQI LI, Institute of Physics, Chinese Academy of Sciences — Charge ordering (CO) is considered to be an important issue that leads to metal-insulator transitions in numerous materials and also shows possible correlations to many notable physical phenomena, such as colossal magnetoresistance, superconductivity and multiferroics. In recent investigations, oxyborate Fe_2OBO_3 has been found to show certain structural and physical features in connection with a continuous CO transition [1, 2]. By using *In-situ* TEM technique, we revealed that the charge-ordering transition characterized by an incommensurate modulation could evidently result in remarkable polar nanodomains at low temperatures. This kind of nanodomain could play a critical role in triggering a high dielectric constant and notable dielectric dispersion as observed in Fe_2OBO_3. Moreover, measurements of the magnetoelectric coupling under electrical field demonstrate the existence of giant electrically induced changes in magnetization around the magnetic transition [1, 2]. 1.Y. J. Song et al., Phys. Rev. B 81, 020101(R) (2010). 2.H. X. Yang et al., Phys. Rev. Lett. 106, (2011) 016406.

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