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Resonant and Non-resonant x-ray Scattering Studies on Multiferroic $TbMn_2O_5$ J. KOO, C. SONG, S. JI, J.-S. LEE, T.H. CHANG, C.-H. YANG, J.-H. PARK, Y.H. JEONG, K.-B. LEE, Department of Physics, POSTECH, T.Y. KOO, Y.J. PARK, J.-Y. KIM, Pohang Accelerator Laboratory, D. WEMEILLE, A.I. GOLDMAN, Department of Physics, Iowa State University, G. SRAJER, Argonne Nation Laboratory, S. PARK, S.-W. CHEONG, Department of Physics, Rutgers University — Comprehensive x-ray scattering studies on single crystal $TbMn_2O_5$, including resonant scattering Mn L edge, Tb L edge and M edges, have been carried out. Non-resonant x-ray scattering data provide the first crystallographic evidence of symmetry lowering. The x-ray intensities were observed at a forbidden Bragg position in ferroelectric phase. Their temperature dependence as well as q-dependence of CDW peaks are consistent with exchange striction mechanism for multiferroicity in the sample. Intensities of incommensurate CDW peaks show anomalous temperature dependences, which are attributed to existence of magnetic ordering having different temperature dependences. Resonant scattering data confirmed that magnetic moments of Mn^{3+}, Mn^{4+} and Tb have different temperature dependences below $T_N \sim 41$K.

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