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Quadrupolar order triggered by magnetic order in GdB_4 HOYOUNG JANG, SSRL, SLAC National Accelerator Laboratory, B.Y. KANG, B.K. CHO, School of Materials Science and Engineering, Gwangju Institute of Science and Technology (GIST), J.-S. LEE, SSRL, SLAC National Accelerator Laboratory — Various electronic and magnetic properties and phase transition of Gd and Gd compounds have been studied. For example, 4f delocalization of Gd metal was revealed by resonant inelastic x-ray scattering study with high pressure condition [1]. Meantime, extremely large positive magnetoresistance in GdB4 was reported [2] – which is unexpected in the general Gd configuration. We investigated GdB_4 by resonant soft x-ray scattering (RSXS) experiment at Gd M-edge. In (100) reflection, huge RSXS signal was observed, which corresponds to the reported antiferromagnetic (AFM) order by neutron scattering measurement [3]. Besides, unexpected RSXS signal was also detected in different photon polarization, which cannot be explained by the reported AFM structure. The energy profile and order parameter show the unexpected signal which has strong coupling but different origin with the AFM order. We deduce that the unexpected signal comes from Gd quadrupolar order, which is triggered by magnetostriction through the AFM order.

[1] B. R. Maddox et al. PRL 96, 215701 (2006).
[2] B. K. Cho et al. JAP 97, 10A923 (2005).
[3] J. A. Blanco et al. PRB 73, 212411 (2006).

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