

Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Spin-lattice coupling of $R_{1-x}\text{Lu}_x\text{B}_4$ revealing anomalous weak ferromagnetism ($R = \text{Sm, Gd, Tb, Dy, Ho}$) B.Y. KANG, School of Materials Science and Engineering, Gwangju Institute of Science and Technology (GIST), Korea, SEONGSU LEE, Korea Atomic Energy Research Institute, Korea, SANG-YUN HWANG, SUNGDAE JI, Max Planck POSTECH/Korea Research Initiative, Korea, M.S. SONG, B.K. CHO, Gwangju Institute of Science and Technology (GIST), Korea — RB_4 ($R = \text{rare-earth elements}$) compounds exhibits antiferromagnetic ordering at low temperature and are classified as the Shastry-Sutherland lattice, which is a geometrically frustrated system. In previous study, it was reported that Y substitution in TbB_4 single crystals causes anomalous WF (weak ferromagnetism) even though Y^{3+} is non-magnetic. The disturbance of a delicate equilibrium in a frustrated system can lead to new electronic and magnetic states. In this study, single crystals of $R_{1-x}\text{Lu}_x\text{B}_4$ ($R = \text{Sm, Gd, Tb, Dy, Ho}$), ($x=0 \sim 0.8$) were synthesized. WF is also observed. TbB_4 went through orthorhombic distortion below Néel temperature. To investigate the existence of orthorhombic distortion in TbLu_xB_4 ($x=0.1, 0.35$), high resolution single crystal x-ray diffraction was performed at 5 K. It was confirmed that the distortion was vanished with Lu substitution. Interestingly, lattice constant a was increased with decreasing temperature below the T_C . The strong correlation between spin-lattice coupling and WF will be discussed in detail.

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Date submitted: 19 Jan 2016

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