Abstract Submitted
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The size and helicity of skyrmions in B20-type chiral magnet $\mathbf{Mn_{1-x}Fe_xGe}$ KIYOU SHIBATA, University of Tokyo, XIUZHEN YU, RIKEN Center for Emergent Matter Science, TORU HARA, National Institute for Materials Science, DAISUKE MORIKAWA, RIKEN Center for Emergent Matter Science, NAOYA KANAZAWA, University of Tokyo, KOJI KIMOTO, National Institute for Materials Science, SHINTARO ISHIWATA, University of Tokyo, YOSHIO MATSUI, National Institute for Materials Science, YOSHINORI TOKURA, University of Tokyo — A magnetic skyrmion is a topologically-stable spin vortex structure observed in chiral-lattice helimagnets. Skyrmions and their crystallized state, skyrmion crystal, have been attracting much attention because of the emergent electromagnetic properties. However, crystal engineering in terms of controlling the skyrmion crystal structure itself is not well established. Here, we report on the correlation between skyrmion helicity and crystal chirality in alloys of $B20$-type chiral-lattice helimagnet $Mn_{1-x}Fe_xGe$ with varying compositions by Lorentz transmission electron microscopy and convergent-beam electron diffraction over a broad range of compositions (x = 0.3 - 1.0)[1]. The skyrmion lattice constant or the skyrmion size shows non-monotonous variation with the composition x, with a divergent behavior around $x = 0.8$, where the correlation between magnetic helicity and crystal chirality changes sign. This originates from continuous variation of the spin-orbit coupling strength and its sign reversal in the metallic alloys as a function of x. Controllable spin-orbit coupling may offer a promising way to tune skyrmion size and helicity.
[1] K. Shibata et al., Nat. Nanotech. 8, 723 (2013).

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