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Observation of spin-wave cooling effect in magnets
TOSHU AN, KEN-ICHI UCHIDA, KAZUYA HARII, YOSUKE KAJIWARA, KAZUYA YAMAGICHI, M.B. JUNGFLEISCH, The Institute for Materials Research, Tohoku University, A.V. CHUMAK, V.I. VASYUCHKA, BURKARD HILLEBRANDS, Technische Universität Kaiserslautern, Germany, EIJI SAITOH, The Institute for Materials Research, Tohoku University — We focused on utilizing a surface spin wave (Damon-Eshbach mode); traveling on top and bottom surfaces in a non reciprocal manner, as a good carrier of heat. As a sample, Yttrium iron garnet (YIG) was chosen because the spin waves excited in the YIG is known to have a long coherence length propagating distances even a few millimeters. By exciting the surface spin wave of only one side, heat transportation was successfully observed by measuring sample temperature with an infrared thermocamera. More interestingly, the temperature where the spin wave is initially excited shows cooling effect to drop its temperature just after the excitation of the surface spin wave. Here we call this effect as microwave cooling effect which is introducing a new cooling principle.

Toshu An
The Institute for Materials Research, Tohoku University

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