

Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Active electromagnetic metamaterial based on spin torque oscillators HIROAKI UEDA, GEN TATARA, KATSUHISA TAGUCHI, YUTA SASAKI, MIYUKI NISHIJIMA, AKIHITO TAKEUCHI, Tokyo Metropolitan University — We propose theoretically an active material for electromagnetic radiation with frequency of GHz by use of spin-torque oscillators. The origin of the amplification is the energy supplied to the magnetization by the injected current. We show that close to a resonance with current-driven magnetization, the imaginary part of magnetic permeability becomes indeed negative for either of the two circular polarizations, resulting in negative imaginary part of refractive index. Besides, the real part of the refractive index is also manipulated by the current. Our system thus realizes an active filter to obtain circular polarized radiation and/or an electromagnetic metamaterial having negative refractive index, both controlled electrically.

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Date submitted: 20 Dec 2012

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