Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Temperature-Tunable Transparency Window in Metamaterials Utilizing Superconducting Dark Resonators C. KURTER, University of Maryland, A.P. ZHURAVEL, National Academy of Sciences of Ukraine, P. TASSIN, T. KOSCHNY, L. ZHANG, Ames Laboratory, J. ABRAHAMS, C.L. BENNETT, University of Maryland, A.V. USTINOV, Karlsruhe Institute of Technology, C.M. SOUKOULIS, Ames Laboratory, S.M. ANLAGE, University of Maryland — We have developed a high quality-factor microwave frequency metamaterial to demonstrate a coherent optical phenomena analogous to electrically induced transparency (EIT). The two-dimensional design employs double planar Nb split rings acting as dark resonators symmetrically placed around a thick Au strip which is a bright resonator [1]. When Nb is in the superconducting state, the significant loss gradient between Nb and Au opens a transparency window along with a strongly enhanced group delay. The data show a systematic evolution with increasing temperature in the superconducting state of Nb, and the features disappear in the resistive state when the loss gradient between the two types of resonators closes. We have observed no RF power dependence of the magnetic response coming out of the EIT configuration, which indicates the process is linear. Laser scanning microscopy images of the RF current distributions in the dark resonators and the other microwave measurements are in good agreement with the simulations run on the same structure.
[1] L. Zhang, *et al.* arXiv:1010.2976

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Date submitted: 14 Dec 2010 Electronic form version 1.4