Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Design of uniaxial metallodielectric metamaterials having large optical nonlinearities JOSEPH GEDDES, ERIK NELSON, PAUL BRAUN, University of Illinois at Urbana-Champaign — We describe how the intrinsically large optical nonlinearities of metals could be accessed and increased by fabrication of uniaxial homogenized composites comprising alternating metal and dielectric layers of subwavelength thickness. Such composites are predicted to exhibit effective third-order nonlinear susceptibilities orders of magnitude larger than those intrinsic to the metallic component. The enhancement is due to a resonance effect, and is limited to the direction perpendicular to the layer interfaces. We illustrate our predictions with calculations for several metallodielectric systems, including those consisting of copper and titanium dioxide components.

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Date submitted: 27 Nov 2007 Electronic form version 1.4