

Abstract Submitted  
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**High Frequency Properties of Magnetodielectric Composites  
Consisting of Oriented Fe-based Flakes Embedded in a Polymeric Matrix<sup>1</sup>**

MICHAEL GOLT, University of Delaware, XIAOKAI ZHANG, University of Delaware, THOMAS EKIERT, University of Delaware, SHRIDHAR YARLAGADDA, Center for Composite Materials, KARL UNRUH, University of Delaware, JOHN XIAO, University of Delaware — Magnetodielectric composites containing small ferromagnetic inclusions in a continuous dielectric matrix could be useful high frequency materials if relatively large and similar values of the permeability ( $\mu$ ) and permittivity ( $\varepsilon$ ) could be obtained. This potential, however, can not be fully achieved for spherical inclusions because their demagnetizing fields severely limit the effective permeability of the composite. Therefore, we have prepared and studied a series of magnetodielectric composites containing oriented Fe-based flakes. The flakes were produced by a mechanical deformation technique and were typically several 100  $\mu\text{m}$  wide and several  $\mu\text{m}$  thick. These flakes were mixed with a styrene based liquid resin and aligned in an applied magnetic field prior to polymerizing the resin. X-ray diffraction and hysteresis loop measurements confirm a significant degree of alignment. Permeability and permittivity measurements indicate that values of  $\mu$  and  $\varepsilon$  in excess of 20 can be achieved in these samples with small losses when the loading fraction of the Fe flakes approaches 50%.

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Xiaokai Zhang  
University of Delaware

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