

Abstract Submitted  
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**Analysis of the Complex Dielectric Permittivity Behavior of  
Porous Al<sub>2</sub>O<sub>3</sub>-SiC Composites in the 1 MHz – 18GHz Frequency Range<sup>1</sup>**

JACOB BATTAT, JEFFREY CALAME, Naval Research Laboratory — The complex dielectric permittivity of electrically lossy, porous Al<sub>2</sub>O<sub>3</sub>-SiC composites was measured as a function of frequency over the range of 0.001-18 GHz (broadband). These composites were fabricated by an infusion method of incorporating SiC polymer precursor into porous alumina discs. Repeat polymer infusions and pyrolysis steps to 1000°C were carried out, with some samples undergoing an additional air-fire prior to each subsequent step. Generally, it was found that for non-air-fired samples, moderate, controllable losses were attainable over a broad frequency range with  $\log \epsilon''$  being inversely proportional to  $\log f$ . By contrast, the dielectric loss attainable for air-fired samples was generally very low. For all samples, various aspects of the variation of permittivity components  $\epsilon'$  and  $\epsilon''$  with frequency were analyzed, with a view to determine the various factors contributing to dielectric response. In addition, the ramifications of this behavior on the properties of the material as a lossy composite were addressed.

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