



Electromagnetic properties of Carbon-Graphene Xerogel, Graphite and Ni-Zn Ferrite composites in polystyrene matrix in the X-Band (8.2 – 12.4GHz)

M.C. Bispo<sup>1\*</sup>; B. H. K. Lopes<sup>2</sup>, B. C. S. Fonseca<sup>2</sup>, J. T. Matsushima<sup>3</sup>, M. K. H. Yassuda<sup>4</sup>, M. R. Baldan<sup>2</sup>, A. C. C. Migliano<sup>4</sup>  
<sup>1</sup> *Federal Institute of Education, Science and Technology of São Paulo;* <sup>2</sup> *National Institute for Space Research;* <sup>3</sup> *São Paulo State Faculty of Technology;* <sup>4</sup> *Institute of Advanced Studies*  
\**matheus.bispo@aluno.ifsp.edu.br*

### Abstract

The electromagnetic properties of Carbon-Graphene Xerogel (CGX), Flaky graphite (GR) and Nickel-Zinc ferrite (FeNiZn) composites in polystyrene (PS) matrix were studied in the X-Band range (8.2 – 12.4 GHz). Expanded polystyrene (EPS) waste material was recycled through its process into polystyrene (PS) in order to be used as dielectric matrix in the composites. It was observed that the increase of CGX and GR influenced on the increase of the Complex Permittivity, and that 10 wt% CGX + 50wt% FeNiZn composite sample demonstrated a absorption peak at 10.5 GHz. The results are relevant concerning the recycling of EPS waste through its use as dielectric matrix, thus developing greener and low-weight composite materials to be used in microwave applications.

**Keywords:** Carbon-Graphene, Composite, Recycling, Polystyrene, X-Band, Microwave