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## Complex permittivity and permeability characterization of Expanded graphite- $\text{Fe}_3\text{O}_4$ -White Cement based magneto-dielectric nanocomposite for X band microwave absorption

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Abstract:

Anechoic chamber used for testing of microwave absorption of devices basically designed by incorporating absorbing materials on the walls of a concrete structure. In this present investigation, a cement based composite embedded with expanded graphite and  $\text{Fe}_3\text{O}_4$  filler has been characterized for complex permittivity and permeability in the frequency range 8.2 to 12.4 GHz by using Nicolson and Ross method employing Agilent 85071E material measurement software. Initially,  $\text{Fe}_3\text{O}_4$  filler materials were synthesized by co-precipitation method and mixed with Expanded Graphite (EG) and White Cement in different wt. % and characterize for microwave properties in the frequency range. SEM characterization for  $\text{Fe}_3\text{O}_4$  particle found to be of size 30 nm. The complex permittivity  $\epsilon_r$  and permeability  $\mu_r$  values showed an increasing trend with increases in filler wt. % with maximum  $\epsilon_r=18-j10$  and  $\mu_r=1.5-j0.35$  for 40 wt. % composition which indicates its suitability for application in preparing walls of Anechoic chamber.

Keywords: Complex permittivity and permeability, expanded graphite, Ferrite

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