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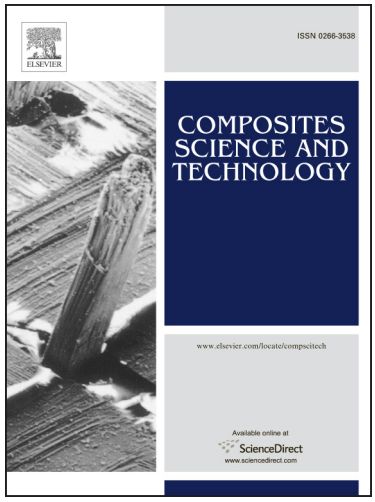

Clean and *in-situ* synthesis of copper-epoxy nanocomposite as a matrix for dielectric composites with improved dielectric performance

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Clean and *in-situ* synthesis of copper-epoxy nanocomposite as a matrix for dielectric composites with improved dielectric performance

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Abstract: A Cu-epoxy nanocomposites has been developed by *in-situ* formation of metal nanoparticles within the epoxy matrix and utilized as a new matrix to enhance the dielectric properties of composites. By using an *in-situ* and clean thermal reduction method, monodisperse Cu nanoparticles with size around 100 nm were generated and uniformly dispersed in epoxy matrices. $BaTiO_3$ ceramic particles with high dielectric constant were incorporated into this Cu-epoxy matrix and the dielectric properties of as-prepared BT/Cu-epoxy composites were investigated. The result showed that the Cu-epoxy matrices effectively enhanced the dielectric constant while maintaining the low dielectric loss for the BT/Cu-epoxy composites as compared with the BT/epoxy composite. In addition, compared with the BT/Cu/epoxy nanocomposite obtained by *ex-situ* (simple blending) techniques, the *in-situ* BT/Cu-epoxy composites exhibited comparable dielectric constant while much lower dielectric loss. The improved dielectric performance of nanocomposites was attributed to the excellent dispersion of Cu nanoparticles as well as the strong interfacial interaction between Cu nanoparticles and epoxy matrix in the *in-situ* Cu-epoxy matrices.

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