Accepted Manuscript

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PII: S0266-3538(16)30948-4

DOI: 10.1016/j.compscitech.2017.04.010

Reference: CSTE 6740

To appear in: *Composites Science and Technology*

Received Date: 15 August 2016

Revised Date: 2 April 2017

Accepted Date: 8 April 2017

Please cite this article as: Sunny AT, Mozetic M, Primc G, Mathew S, Thomas S, Tunable morphology and hydrophilicity to epoxy resin from copper oxide nanoparticles, *Composites Science and Technology* (2017), doi: 10.1016/j.compscitech.2017.04.010.

Tunable morphology and hydrophilicity to epoxy resin from copper oxide nanoparticles

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Abstract

Nanosized copper (I) oxide particles (nCOP) synthesized through chemical reduction reaction was employed to formulate an epoxy based novel nanocomposite material. Wetting characteristics of the nanocomposites were studied through contact angle measurements as a function of filler content. The contact angle of epoxy with water decreased from 79^{o} to 35^{o} when the filler content is varied from 0 to 10 phr indicating an upsurge in the hydrophilicity of the material. When the nCOP content is increased from 0-10phr, the surface free energy and work of adhesion endured a hike around 50% by magnitude, interfacial free energy suffered a decrease by half of its initial value, spreading coefficient became more positive while Girifalco-Good's interaction parameter changed by around 10%. The improvement in hydrophilicity of nanocomposite was attributed to the enrichment of the polymer surface with nanoparticles. The contact angle values of the