Accepted Manuscript

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PII: S1359-835X(17)30382-2
DOI: https://doi.org/10.1016/j.compositesa.2017.10.023
Reference: JCOMA 4812

To appear in: *Composites: Part A*

Received Date: 21 June 2017
Revised Date: 6 October 2017
Accepted Date: 22 October 2017

Please cite this article as: Sharma, S., Singh, B.P., Chauhan, S.S., Jyoti, J., Arya, A.K., S.R.Dhakate, Kumar, V., Yokozeki, T., Enhanced Thermomechanical and Electrical Properties of Multiwalled Carbon Nanotube Paper Reinforced Epoxy Laminar Composites, *Composites: Part A* (2017), doi: https://doi.org/10.1016/j.compositesa.2017.10.023

Enhanced Thermomechanical and Electrical Properties of Multiwalled Carbon Nanotube Paper Reinforced Epoxy Laminar Composites

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Abstract

Thermomechanical and electrical properties of multiwalled carbon nanotubes (MWCNTs) bucky paper reinforced epoxy laminar composites have been studied. Incorporation of bucky paper in epoxy matrix led to improvement in thermomechanical properties but it reduced through-plane electrical conductivity. Therefore, 0.05 wt.% of MWCNTs is incorporated as secondary network in epoxy matrix to improve the electrical conductivity. The storage modulus for a 0.05 wt.% dispersed MWCNTs in epoxy resin impregnated 20 plies of bucky paper based composites (20Ply.05) was 4.84 GPa as compared to 2.24 GPa of pure epoxy. The glass transition temperature of 20Ply.05 laminar composite reaches to 191.6°C as compared to pure epoxy 168.5°C. The increment in electrical conductivity (792%) is reflected in improved electromagnetic shielding effectiveness (SE) over a wide frequency range of X & Ku band. The SE of more than ~ -50 dB for 20Ply.05 laminar composite in both the bands was obtained.

Keywords: Multiwalled carbon nanotubes (MWCNTs), Bucky paper, Dynamic mechanical analysis, Storage modulus (E´), Glass transition temperature (T_g), EMI shielding.