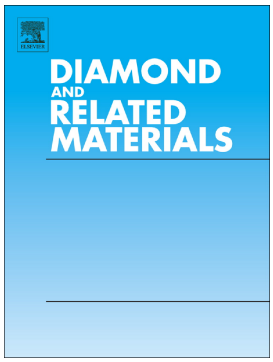

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Conduction pathways in CNF/PTFE composite: Air oxidized CNFs coated with the incomplete layer of PTFE

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Abstract

In the present work, the conduction pathways by air oxidized carbon nanofibers (CNFs) (coated with Polytetrafluoroethylene (PTFE)) dispersed in PTFE polymer have been studied and explored with backbone and dangling ends model. The utility of critical exponents (t) explained the distribution status of CNFs and indicated the possibility of charge transport by ohmic conduction due to connected conducting channels of CNF and tunneling transmission between close CNFs. A 5 wt% sample exhibit a conductivity of 1.91 S/m. Moreover, a cost and material saving method of coating of decomposed PTFE on CNF; regardless of the coating thickness are discussed and studied in order to improve interfacial interaction and dispersion within the polymer without using sonication. Some interesting and informative evidence have also been revealed as a decrease in d-spacing of <002> layer of a CNF after heat treatment at ~800^{0}C in air and confirmation of presence and coating of hexafluoropropylene (HFP) and Octafluoro-1-butene (OF1B) thermal products of PTFE on CNFs by FTIR and TEM respectively.

Keywords: Nanocomposite; Carbon nanofibers; Sintering; Coating; backbone and dangling ends; X-ray diffraction (XRD).

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