Amir Elsaidy et al., Res. Rev. J Mat. Sci. 2018, Volume 6
DOI: 10.4172/2321-6212-C3-020

Novel carbon nanomaterials coated with CuO particles via electroless plating for nanothermite applications

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Carbon nanomaterials (CNMs), such as carbon nanotubes (CNTs) and carbon nanofibers (CNFs) can be employed as carriers for superthermite particles via coating or encapsulation. This study reports on the synthesis of copper oxide coated CNTs and CNFs via electroless plating which offer metallization with uniform distribution layer of copper. The copper coated CNTs and CNFs were annealed at 250˚C to obtain copper oxide coated CNMs. The developed hybrid CNMs were characterised with TEM which demonstrated uniform coating with CuO particles. XRD diffractograms demonstrated highly crystalline CuO particles superimposed on the surface of CNMs. CuO coating can act as an effective oxidizer for aluminium particles in superthermite applications. The developed CuO-coated CNMs were effectively dispersed in isopropyl alcohol with aluminium particles (100 nm) using ultra sonic probe homogenizer. The developed hybrid nanothermite materials were effectively integrated and dispersed into molten TNT. Whereas CuO-coated CNFs/Al binary mixture demonstrated an increase in shock wave strength by 6.5% using kast test; CuO-coated CNTS/Al binary mixture demonstrated an increase in destructive effect of TNT by 15.5%. The superior performance of CuO-coated CNTs was ascribed to the fact that CNTs can offer extensive interfacial surface area of 700m^2/g. Consequently it could act as an ideal carrier for highly energetic particles.

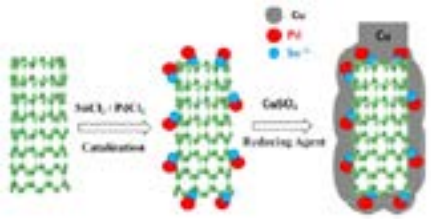

Figure: Schematic diagram of CNMs metallization with Copper

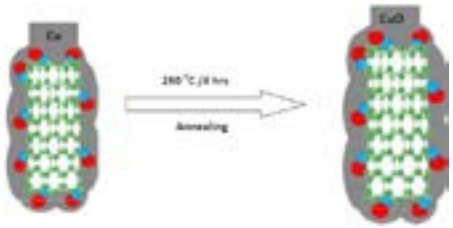

Figure: Schematic diagram of Copper oxide coated CNMs formation by annealing

Recent Publications

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Biography

Amir Elsaidy had graduated from military technical college, Egypt (chemical engineering branch). He has experience in preparations and developments in the field of chemical engineering and energetic materials by creating new pathways for improvements .My interesting's are in preparation and spectral performance evaluation of these materials. These materials were developed by granulation and subsequent pressing & their Spectral performance was conducted.

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