Studies on The Effect of Hybrid Reinforcement of Graphene – CNTs On The Aluminum Matrix Composites Prepared By Powder Metallurgy

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Abstract:

Hybrid graphene - CNTs / Aluminum composites are prepared by powder metallurgy. Graphene-CNTs reinforcements solution is adsorbed on aluminum particles surface through electrostatic self-assembly. The graphene-CNTs solution is prepared using graphene : CNTs ratios of 1:0, 3:1, 1:1 and 1:3. Subsequently, the prepared composite powders are compacted under 500 MPa and vacuum sintered at 600oC. Microstructural investigation of the starting materials, composite powder and sintered composite samples are obtained through XRD, SEM and TEM analysis. The hardness, wear resistance and coefficient of thermal expansion (CTE) are estimated. Both SEM & TEM refers to a good distribution of graphene & CNTs in the Al matrix specially 1:1 sample. The hardness generally increases with additions of graphene - CNTs reinforcement. The hardness values are increased from 57.5 2.7 HV for pure Al up to 115.3 4.5 HV (100.7%) with graphene - CNTs (1:1) reinforcement. The wear rate reduces drastically from 1.07 mg/s for pure Al to 0.022 mg/s (97.9%) for graphene-CNTs (1:1) reinforced composite. A sharp decrease in CTE is also observed for hybrid graphene-CNTs reinforced composite in comparison with pure Al and 1: 0 graphene - CNTs composite. The results show synergistic reinforcement potential between graphene and CNTs at-or-near the 1:1 stoichiometric ratio.

Biography:

Omayma Elkady has completed her PhD at the age of 35 years from Cairo University . She is Associate pro, & head of powder technology division at Central Metallurgical R&D Institute (CMRDI) She has published more than 35 papers in an international journals in powder metallurgy science. She is supervisor on more than 40 Maste & Ph.D students. She is a member in an Egyptian- American project.