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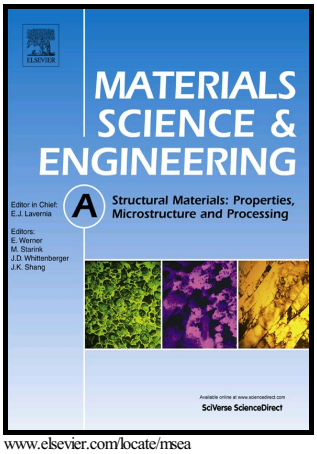

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Strengthening mechanism in graphene nanoplatelets reinforced aluminum composite fabricated through spark plasma sintering

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ABSTRACT

Graphene nanoplatelets (GNP) reinforced aluminum matrix composites, with ≤ 5 wt% GNP content, were synthesized by spark plasma sintering (SPS). GNPs were found to withstand severe conditions of high pressure and temperature during processing. Strength of composite was observed to be depending on the content and uniform dispersion of GNP in aluminum matrix, as verified by scanning electron micrographs. X-ray diffraction analysis confirmed that no reaction products exist at Al-GNP interface in significant amount. Instrumented indentation studies revealed improvement in hardness by 21.4% with 1 wt% GNP. This is due to the presence of stronger reinforcement, which provides high resistance to matrix against deformation. Improvement in yield strength and tensile strength was 84.5% and 54.8%, respectively, with 1 wt% GNP reinforcement. Properties deteriorated at higher concentration due to agglomeration of GNP. Reinforcing effect of GNPs, in terms of strengthening of composite, is found to be

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