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Title: Engineering Properties of Graphene - Ceramic Nanocomposites by Incorporating Defects in Graphene

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Abstract

A novel strategy for producing ceramic – graphene nanocomposites with customizable mechanical and electrical properties without changing the amount of graphene has been presented. Structural and crystalline defects were produced in graphene using high-power tip ultrasonication for 20, 40 and 60 minutes. Raman spectroscopy and thermogravimetric analyses were conducted to characterize degradation in graphene. Alumina – graphene nanocomposites were then prepared using Spark Plasma Sintering. Fracture toughness and electrical conductivities were measured for alumina nanocomposites containing 0.5 vol% and 3 vol% graphene respectively. Electrical conductivity and fracture toughness values of alumina – graphene nanocomposites decreased with the increase in structural defects in graphene. The quality of graphene has no influence on the grain size of the alumina nanocomposites.

Biography

Dr. Inam's research and enterprise expertise is primarily focused around improving the performance and functionalities of engineering products using nano-influenced smart materials. He has conducted several consultancies and widely published research of great commercial and scientific significance in leading peer-reviewed journal for all types of engineering materials (metals, ceramics, polymers and composites). His most recent efforts have been devoted towards the development of advanced materials (ceramics, polymers, metals and composites) and nanomaterials (including fullerenes and graphene) for aerospace, petroleum, industrial, defense and bio sectors. His expertise includes materials physics, processing, characterization, performance evaluation, applications and materials sustainability. To date, he has contributed in achieving more than USD 1 million research and enterprise income from government and commercial platforms. Some of his funders include Royal Society, British Council, Innovate UK, Dstl/ MoD, University of London, Commonwealth Scholarship Commission etc. He has also presented as a keynote speaker at various leading international conferences in the area of materials science and engineering. Dr. Inam has produced several high impact publications and his h-index is currently 18. He has authored/ co-authored more than 100 papers in peer-reviewed scientific journals and conference proceedings and has received more than 1000 citations to date. Dr. Inam was awarded Doctor of Philosophy (Ph.D.) in nanomaterials engineering from Queen Mary, University of London (QMUL, London) in early 2009. He is the recipient of 2007 materials world award by the IoM3, UK. In 2004, he received gold medal for the best academic performance in his BEng (Hons) metallurgy and materials engineering programme.