

**Computation of Mechanical Properties of
Nanostructured Materials**

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Abstract

Nanostructured materials exhibit enhanced mechanical, magnetic, electrical and optical properties. The grain size and the presence of metallic nanoparticles as a second phase in a ceramic matrix play important roles in enhancing the mechanical properties and fracture toughness of any nanocomposite system. The aim of the present study was to investigate the mechanical properties of the Ni/alumina nanocomposite system. Preliminary computation considering the roles of grain boundary diffusion, triple junctions, and dislocation pile-up in the nanometer domain grain size was carried out, which help pinpointing the applicability of Hall-Petch and inverse Hall-Petch relations for evaluating the mechanical properties metal-ceramic nanocomposite. The outcome of the investigation is expected to be a valuable tool in designing bulk nanocomposite components comprising of metallic nanoparticles in ceramic matrix.