

## 2<sup>nd</sup> International Conference and Exhibition on Mechanical & Aerospace Engineering

September 08-10, 2014 Hilton Philadelphia Airport, USA

## Role of nanoscale characterization in improving tribological properties of materials

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N anoparticles play an important role in determining the hardness, fracture toughness, and strength of materials. Nanoparticles with size ranging from 1-100 nm are beginning to play a strong role as additives in metals and alloys, contributing to their high hardness and low plasticity. This presentation focuses on a class of nanomaterials called 'nanodiamond'. Nanodiamond additives have been shown to improve tribological properties and enhance mechanical properties in varied classes of materials such as polymer composites, engine oils and lubricants. Although experimentally shown to improve mechanical properties, the nanoscale origins of how these nanoparticles interact with their host atoms and molecules is unknown. In this presentation, we explore scanning probe microscopy as a tool to study interaction between nanodiamond particles, throwing greater light on interaction forces at the nanoscale. As an example, using force-distance spectroscopy, we show that nanodiamonds show reduced adhesion with a scanning probe tip, thus making them effective as lubricant additives.

## **Biography**

Vasudeva Rao Aravind has completed his PhD at the age of 32 years from Pennsylvania State University and he is currently an assistant professor of physics at Clarion University. He is the Director of Sustainability minor at Clarion University, an institution of the Pennsylvania State System of Higher Education. He has published more than 14 papers in reputed journals relating to condensed matter physics, and materials science and engineering.

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