

MATERIALS AND STRUCTURES SYMPOSIUM (C2)
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NANODIAMONDS ARE SPACE TECHNOLOGY BEST FRIENDS

Abstract

The unique features of nanodiamonds have demonstrated unprecedented performance in various fields. Nanodiamond powder is a state-of-the-art material widely used in polishing compositions, coatings, lubricants and polymers. Currently nanodiamond powder is rapidly finding its way into biomedicine, Thermal Management in electronics, energy storage, field emission displays and other advanced applications. Since nanodiamonds can "transfer" diamond like properties (heat conductivity, electrical insulation, strength of material) they are natural candidates for space applications and technologies such as: Rad-hard parts and coatings, Advanced composite reinforced with ND for space environment, Weight reduction by reinforcing existing materials, Electric propulsion plasma-environment ceramics, Anti friction technology for moving parts, bearings and momentum wheels, Thermal conductive, electric insulating advanced materials. The presentation will include an introduction to Nanodiamonds, current technologies for producing and manipulating nanodiamonds and prospects for the future. The presentation is in collaboration with Ray techniques, an Israel nanodiamonds company. Ray techniques has developed technology for producing nanodiamonds based on the laser treating of specially prepared targets containing carbon soot mixed within hydrocarbon media. In contrast to the traditional technology of nanodiamonds synthesis by detonation of explosives in metal reactors, Ray's method is controllable, environment-friendly and non-hazardous. Ray-nanodiamonds are of much higher purity than detonation nanodiamonds available today in the market. In addition, the company has developed a new approach in the design of novel nanodiamond composite materials with desired properties. This technology is based on special nanodiamond surface modification, full disaggregation and covalent bonding between diamond nanocrystals and molecules of chosen material. Uniform introducing nanodiamonds within the medium results in increase of nanodiamond performance in each compound and in the possibility to reduce nanodiamond content and the cost of the composite material. Due to this innovative approach, the company has developed low cost and highly efficient nanodiamond based products for various technological processes.