

## **Production of Advanced Nano-Diamond Additives (PANDA) From Lab to Fab**

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**Nanodiamonds (ND) due to their unique properties can be highly efficient in wafers and optical crystals polishing, antifriction treatment reducing wear, diverse metallic and polymeric coatings, reinforcing polymers, heat dissipation in electronics and electrical engineering, fabrication of onion-like carbons for energy storage and EMI shielding, radiation resistant composites and diverse biomedical solutions (cancer treatment, early diagnostics and cell imaging). However, insufficient purity and homogeneity of commercially available ND produced by detonation of explosives in closed chambers, as well as difficulties of ND disaggregation and dispersing, considerably restricts the wide use of this unique material and its commercial applicability [2]. Novel technology for synthesis of pure and uniform ND by laser treatment of specially prepared hydrocarbon targets and fabrication of concentrated ND dispersions within various media has been developed and implemented in a laboratory scale [3]. The optimization of laser parameters of the existing synthesis process and the use of high power solid state Q-switch or fiber lasers with maximal repetition rate enable to increase in the ND output by 2 orders of magnitude and to pass to industrial production of high-quality low-cost and ready for use ND additives in the form of powders, slurries and masterbatches. Presented results of the recent development of ND inks [4] demonstrate their performance in electrical insulation and heat dissipation in printed electronics, their efficiency in security protection and their applicability in rapid diagnostics. ND even in negligible amounts can dramatically improve existing materials and processes enabling breakthroughs in medicine, electronics, machinery & energy.**