Abstract Submitted
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Deaggregation, Modification, and Developing Applications for Detonation Nanodiamond VADYM MOCHALIN, Missouri University of Science & Technology — Nanodiamond powder (ND) is one of the most promising materials for advanced composites and biomedical applications [1]. It is also a commercial precursor for carbon nanoonions – material for high power micrometer size supercapacitors and potentially, Li-ion batteries. ND is produced by detonation of explosives with negative oxygen balance in a closed chamber, where extremely high pressures and temperatures develop during detonation. ND consists of diamond particles of ˜5 nm diameter, combining fully accessible large surface and rich and tailorable surface chemistry. ND has unique properties including optical, electrical, thermal, and mechanical, and is biocompatible and non-toxic. Due to numerous surface functional groups, ND has catalytic and electrochemical activity. Several techniques have been proposed for ND deaggregation based on milling with costly ceramic microbeads, leaving difficult to remove contaminations in the resulting ND suspension. We have recently discovered a novel, green technique for ND deaggregation using sonication in aqueous sodium chloride slurry [2]. Upon completion of the process sodium chloride can be easily washed out with water leaving behind no contaminants and yielding stable single-digit ND colloids. Modification and development of applications for ND in composites, drug delivery, biomedical imaging, etc., will be also discussed.

[1] $Mochalin, V.N. etal. Nat. Nanotechnol.$, 2012, 7, 11
[2] $Turcheniuk, K. etal. ACS Appl. Mater. Interfaces$, 2016, 8, 25461

Vadym Mochalin
Missouri Univ of Sci & Tech

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