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Multifrequency scanning probe microscopy study of nanodiamond agglomerates[1] VASUDEVA ARAVIND, STEPHEN LIPPOLD, Clarion University, QIAN LI, EVGHENY STRELCOV, BARIS OKATAN, Oak Ridge National Laboratory, BENJAMIN LEGUM, Clarion University, SERGEI KALININ, Oak Ridge National Laboratory, CLARION UNIVERSITY TEAM, OAK RIDGE NATIONAL LABORATORY TEAM — Due to their rich surface chemistry and excellent mechanical properties and non-toxic nature, nanodiamond particles have found applications such as biomedicine, tribology and lubrication, targeted drug delivery systems, tissue scaffolds and surgical implants. Although single nanodiamond particles have diameters about 4-5nm, they tend to form agglomerates. While these agglomerates can be useful for some purposes, many applications of nanodiamonds require single particle, disaggregated nanodiamonds. This work is oriented towards studying forces and interactions that contribute to agglomeration in nanodiamonds. In this work, using multifrequency scanning probe microscopy techniques, we show that agglomerate sizes can vary between 50-100nm in raw nanodiamonds. Extremeties of particles and Interfaces between agglomerates show dissipative forces with scanning probe microscope tip, indicating agglomerates could act as points of increased adhesion, thus reducing lubricating efficiency when nanodiamonds are used as lubricant additives.

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