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Structure of water and ice next to graphene SARANSHU SINGLA, The University of Akron, EMMANUEL ANIM-DANSO, Solvay Speciality Polymers, GA, AHMAD ISLAM, YEN NGO, STEVE KIM, RAJESH NAIK, Air Force Research Lab, Ohio, ALI DHINOJWALA, The University of Akron, THE UNIVERSITY OF AKRON COLLABORATION, AIR FORCE RESEARCH LAB, OHIO COLLABORATION — Graphene, due to its excellent electrical, mechanical and optical properties, has become a material of increasing interest in many applications, where it comes in contact with water, ions, polymers and biomolecules. The knowledge of the molecular level interactions of graphene with these molecules is the key to optimizing performance; for example, the band gap of graphene can be tuned by means of water adsorption. However, lack of surface sensitive experimental techniques has led to limited understanding of molecular level interactions. Here, we report a study of the graphene-water interface using surface sensitive sum frequency generation (SFG) spectroscopy. The strong interactions between graphene and water lead to enhanced ordering of water molecules at the graphene-water interface. We also use the graphene-water system as a model to understand the heterogeneous ice nucleation on soot particles in the atmosphere. Future work will focus on extending this study to more complex systems including graphene and biopolymers.

Saranshu Singla
The University of Akron

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