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New insights into mechanism of nanotube chirality formation: Liquid catalyst

OCT 24 | Bldg. 101
TUES 16:00 | Seminar Room on the 1st floor

After twenty-five years of studies of carbon nanotubes, it has become apparent that the biggest fundamental challenge in the field is the origin of chirality, since nanotube properties, and thereby exploitations are delicately reliant on chirality. Nowadays, dominant models claim chirality origination by catalyst structure via an epitaxial relationship. Yet, based on accumulated knowledge it is difficult to rule out the role of carbon cluster itself. We targeted this dilemma by exploitation of floating liquid metal droplets as a catalyst for growth of carbon nanotubes that excludes any impact of catalyst features. Despite liquid droplet isotropic surface, we have discovered preference towards specific chiral angles, which implies chirality origination by carbon nuclei. Results will be presented within the nucleation kinetics theory in relation to Zeldovich factor and equilibrium critical size of carbon nucleus. Nanotube chirality as a product of interplay between dual origins: carbon cluster intrinsic preferences and induction by catalyst structure will be discussed.

About the speaker. Dr. Avetik R. Harutyunyan is currently a Chief Scientist and Project Leader in the Materials Science Division at Honda Research Institute USA Inc., (Columbus, OH). He is also an Adjunct Professor in the Physics Department of The Pennsylvania State University (USA). His areas of research include the studies of nanoscale materials, their growth and properties for alternative energy and artificial intelligence perspectives. He is an author of more than 150 scientific publications and 107 patents worldwide.

You are cordially invited to attend!

Tuesday Colloquium