

**Plenary Talk**

PV VI Wed 9:00 Audimax

**Low pressure dusty plasmas for the synthesis of nanocrystals and quantum dots** — •UWE KORTSHAGEN — University of Minnesota, Minneapolis, MN, USA

Chemically reactive nonthermal plasmas at low pressure are an interesting environment for the growth of nanocrystals. Molecular precursors are dissociated by electron impact reactions and the resulting molecular fragments and radicals, many of them charged, nucleate to form clusters and nanocrystals. Energetic surface reactions can heat these initial clusters to temperatures that exceed the gas temperature by hundreds of Kelvin. This enables plasmas to form crystalline nanoparticles even of materials with very high melting points. This presentation briefly discusses the physics of the plasma nanocrystal

growth mechanisms and then highlights some examples of applications of plasma synthesized nanocrystals. Silicon quantum dots with the proper surface functionalization exhibit strong photoluminescence, different from bulk silicon material, and have shown promising properties for solar luminescent concentrators. The ability of plasmas to produce doped nanocrystals has recently enabled new insights into the electronic transport in nanocrystal films, including the first observation of the insulator-to-metal transition in plasma-produced nanogranular media. Plasma produced nanocrystals also have interesting properties for new photonic applications.

This work was supported by the U.S. National Science Foundation (award DMR-1420013) and the Army Research Office MURI grant W911NF-18-1-0240.