

CBC SEMINAR ANNOUNCEMENT



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Nanomaterials Synthesized in Helium Droplets

By doping superfluid droplets of 10^6 to 10^{10} helium atoms (HeN) with foreign atoms or molecules, cold complexes of atomic or molecular species are formed that can either be investigated by molecular beam spectroscopic methods or deposited on solid substrates for surface analysis [1]. In this way, large Cu, Ag, Au, Ni, Co, Fe, Pd, Cr, or V₂O₅ aggregates of different morphology have been generated and deposited on solid carbon, h-BN, or SiN substrates. Employing different pick-up cells for doping the droplets, nanowires of 2 to 5 nm diameter and around 100 nm length, as well as core-shell clusters with one metal surrounding a core of a different species are produced.

Before deposition, time-of-flight mass spectroscopy and laser excitation measurements serve as diagnostics. After surface deposition, the samples are removed and various measurement techniques are applied to characterize the created particles: scanning electron microscopy at atomic resolution, electron tomography [2], temperature dependent SEM and TEM up to 1000 degree C, energy-dispersive x-ray spectroscopy (EDXS), electron energy loss spectroscopy (EELS) and optical absorption. Results of our investigation of the thermal behavior of deposited nanoparticles [3] and the corresponding phase changes and chemical reactivity on the nanoscale will be reported [4, 5].

- [1] P. Thaler et al., *J. Chem. Phys.* **143**, 134201-1-10 (2015),
- [2] G. Haberfehlner et al., *Nature Communications* **6**, 8779-1-6 (2015).
- [3] M. Schnedlitz, *PhysChem ChemPhys* **19**, 9402-9408 (2017).
- [4] M. Lasserus, *Nanoscale* **10**, 2017-2024 (2018).
- [5] M. Schnedlitz, *ACS Chemistry of Materials* **30**, 1113–1120 (2018).

Date:	9th April 2019 (Tuesday)
Time:	11.00am to 12.30pm
Venue:	SPMS Research & Graduate Studies Office Conference Room
Host:	Associate Professor Loh Zhi Heng