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Deposition of Metal Clusters Formed Inside Superfluid Helium Nanodroplets

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We have recently successfully synthesized silver (Ag_n) and chromium (Cr_n) nanoclusters inside superfluid helium nanodroplets (He_n) and deposited these metal clusters on an amorphous carbon (a-C) surface. Transmission electron microscope (TEM) images shall be presented as well as microbalance measurements.
During the past decade, He_n turned out to offer a unique experimental environment, combining both a least perturbing superfluid quantum matrix at 0.4 K and a well defined local confinement, given by the droplet radius of a few nanometres. Therefore these nanocryostats are well suited for the synthesis of metal nanoclusters.
The first surface deposition of nanoclusters (Ag_n) assembled inside He_n has only recently been demonstrated [1]. We were now able to deposit Cr_n using the same method. The comparison of Ag_n and Cr_n measurements indicates a strong oxidation of Cr_n, while this is not the case for Ag_n. In the next step we want to form bimetallic core shell structures in He_n by sequential particle pickup. Due to the formation process in the favourable superfluid environment, we expect a radial symmetric structure of these bimetallic nanostructures, where a shell of silver atoms encloses and therefore passivates the chromium core.
Besides the TEM images and microbalance investigations, we seek to present more detailed chemical information obtained from X-ray photoelectron spectroscopy (XPS), energy dispersive X-ray spectroscopy (EDX) and electron energy loss spectrometry (EELS) measurements.

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[1] E. Loginov, L. F. Gomez, and A. F. Vilesov; *J. Phys. Chem. A* **115,** 7199-7204 (2011)