THE CHANGE OF THE ELECTRONIC STRUCTURE OF METAL CLUSTERS UPON HYDROGEN CHEMISORPTION

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The investigation of chemisorption on metal surfaces gives deep insight in catalytic processes and is important in technology. In cluster science a new variable appears. By varying the cluster size, the electronic and geometric structure of the particle changes. In addition, new building blocks for solid state materials consisting of such clusters can be designed. E.g. the neutral $Al_{13}H$ cluster is highly symmetric and has a closed electronic shell. Its large HOMO-LUMO gap, similar to that of C_{60}, makes it to a promising canidate for a new cluster material.
Here we report systematic studies of the change of the structure of size selected metal-clusters upon hydrogen chemisorption. The clusters are generated with a pulsed arc cluster ion source and hydrogen is mixed with the seeding gas. The anions are mass separated in a reflectron time-of-flight mass spectrometer. Electron spectra are recorded with a "magnetic bottle"-type time-of-flight electron spectrometer. First data on $Al_nH_m^-$ [1], $Ti_nH_m^-$ [2] and $Au_nH_m^-$ are presented.

[1] S. Burkart, N.Blessing, B. Klipp, J. Müller, G. Ganteför, G. Seifert, Chem. Phys. Lett. **301** (1999) 546-550.
[2] S. Burkart, N. Blessing, G. Ganteför, Phys. Rev. B **60**, 23 (1999) 15639-15642