L-04 **Monday, 13.06., 17^{40} - 18^{20}**

Unusual observation of image potential states of nanosized Ag clusters, observed by direct photo emission

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Ag films are grown by Van der Waals epitaxy on cleaved WSe_2 (0001) surfaces. For low coverage the growth mode is Volmer-Weber type leading to (111) oriented islands as demonstrated by LEED. Islands of about 70 nm diameter for a nominal 3 Å film grow in registry with the substrate. For p-type substrates a surface photovoltage is generated at the Schotky barrier between substrate and film, which can be easily followed by the position of the Schockley type surface state S1 of the Ag(111) surface exposed to vacuum. For low photon energies an emission out of image potential states belonging to the Ag(111) surface are observed directly in normal photoemission: These emissions are lost for thicker films when a continously closed film is prepared. Normally image state emissions are only observed by inverse photoemission or two photon photo emission experiments. Here the emission is explained by a roughness induced lowering of the potential barrier at the sides of the clusters leading to a direct photoemission below the nominal workfunction of the (111) surface.

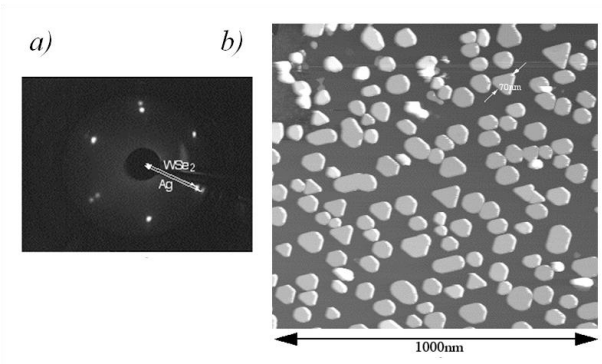

Figure 1: a) LEED pattern of 12 Å Ag on WSe_2, 66 eV; b) STM image of 10 Å Ag on WSe_2.

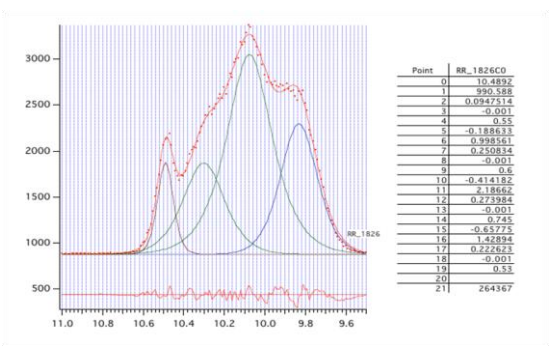

Figure 2: Spectrum taken with 4.6 eV E_{phot} for 6 Å Ag film.

L-05 **Session A, Tuesday, 14.06., 9^{00} - 9^{40}**

Double pulse X-ray Photon Correlation Spectroscopy using hard X-ray delay line

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The conventional X-ray Photon Correlation Spectroscopy (XPCS) [1] technique at 3rd generation synchrotron sources is routinely probing nanoscale dynamics of condensed matter systems (e.g. capillary wave flucutations, magnetic domain fluctuations, rheological properties of soft matter, dynamics in glass-forming systems) at time scales between milliseconds to hours. X-ray Free Electron Lasers (XFEL) based on Self Amplified Spontaneous Emission (SASE) deliver ultra-fast and spatially highly coherent hard X-ray radiation with extreme peak brightness
($\approx 10^{12}$ photons in a single pulse) making it an ideal probe for studying atomic-scale dynamics in various condensed matter systems whose characteristic times can be considerably shorter than time resolutions provided at storage rings (≈100 ps). At the existing X-ray FEL sources, the time resolution of XPCS measurements is defined by the repetition rates of the X-ray pulses to few milliseconds. Moreover due to severe fluctuations in intensity and position of the FEL pulses [2], it is difficult to obtain proper photon correlation between successive scattering signals. In principle, these obstacles can be overcome by employing the "split-delay" approach i.e using hard X-ray delaylines [3].

Here, we report on successful implementation of the hard X-ray delayline [4,5] at the Linac Coherent Light Source. The device is capable of providing two X-ray pulses with controllable time delays ranging from a few femtoseconds to nanoseconds, which is sufficient for probing ultrafast phenomena in versatile choices of condensed matter systems. The measured throughput of the device within 1.47×10^{-5} energy bandwidth of the exit beam at 7.9 keV is 30% [5]. The X-ray FEL pulses after the X-ray delayline are used to generate high (69%) contrast speckle patterns from nanoparticles (as shown