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Names and affiliations of applicants (* indicates experimentalists):

Paolo Ghigna*[1], Sonia Pin*[1], Giorgio Spinolo*[1], Wolfram Steurer*[2], Tullio Scopigno*[3]

[1]Dipartimento di Chimica Fisica "M. Rolla", Università di Pavia, V.le Taramelli 16, I-27100, Pavia, Italy
[2]Institut fuer Experimentale Physik Karl-Franzens-Universität Graz Universitätsplatz 5 A-8010 Graz Austria
[3]INFM-CNR-SOFT Center for Complex Dynamics in Structured SystemsDipartimento di Fisica -

Report:

Ga films were obtained by thermal evaporation under ultrahigh vacuum of ultra pure Ga (99.999 %) and condensation on a carefully cleaned amorphous silica substrate (18x7x1 mm^3) kept at 323 K. At that temperature, liquid Ga self-organizes (Volmer-Weber growth mode) in islands, whose shapes are truncated spheres with a contact angle of about 130 °. Due to the small sample thickness (few nanometers, well below the absorption length of approximately 50 microns) the IXS spectra have been aquired using the recently developed grazing incidence geometry [1, 2] which allows for a surface sensitive framework, with the X ray beam impinging on the sample below the critical angle. Two samples have been investigated, with raddi of the truncated speres of 5 and 20 nm, respectively. The samples have been mounted into a cryostat and the measurements were performed in the 300 - 200 K temperature range: due to the very challenging nature of the sample (the Ga amount in the beam were extremely limited) the count rate at the detector was very small, and particularly long acquisition times were need. For this reason, only the above mentioned range of temperatures could be explored. It should be noted, however, that the very fact that IXS spectra could be obtained from our samples is an interesting outcome by itself. The results that have been obtained could be summarised in Fig. 1. After normalisation for the sapphire substrate data, the IXS data collected on Ga nanoparticles of 5 and 20 nm in radius revealed the presence of an acoustic phonon. The speed of sound deduced by these data correspond to *c.a.* 3000 ms^{-1} and, being in agreement with previous data on liquid Ga [3], points towards a "real liquid" phase for the Ga nanoparticles of smaller size. Although very interesting the data are not conclusive and need to be extended to lower temperatures, to fully understand the nature of the disorderd phase that has been found for the Ga nanodroplets at 90 K [5, 6].

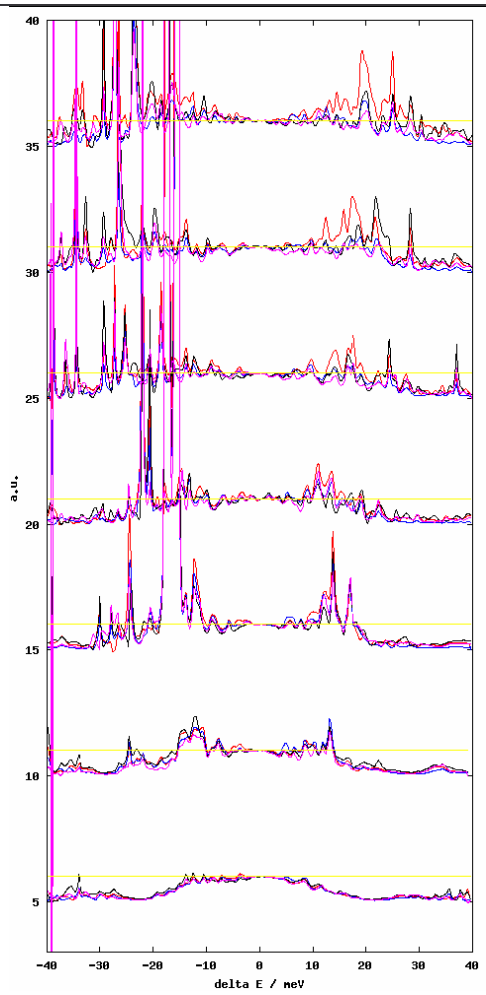

Fig. 1 - Fig. 1. - S(Q)-spectra of analyzers 1, 6, 2, 7, 3, 8 & 9 divided by the sapphire data revealing an acoustic excitation in the Ga droplets. All spectra are vertically shifted by 5 units for better clarity. Magenta: 5 nm Ga, 200 K, black: 5 nm Ga, 292 K., blue: 20 nm Ga, 260 K, red: 20 nm Ga, 292 K, yellow: constant line indicating "1" for each analyzer. Q = 3.25 nm^{-1}, 4.41 nm^{-1}, 5.64 nm^{-1}, 6.81 nm^{-1}, 8.03 nm^{-1}, 9.20 nm^{-1}, 11.58 nm^{-1} (from the bottom)

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