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Names and affiliations of applicants (*indicates experimentalists):

- F. Romanato*
  TASC-INFM, 34012 Basovizza (Trieste), Italy
- D. De Salvador*, M. Tormen*
  Dip. di Fisica "G. Galilei" Univ. di Padova, via Marzolo 8, 35131 Padova, Italy
- F. Boscherini*
  INFN, Lab. Naz. Frascati, P.o. Box 13, 00044 Frascati (Rome), Italy

Report:

The aim of the experiment was to understand the behaviour of interatomic distances in samples which undergo to a macroscopic deformation due to external constrains.

The XAFS measurements on the Ga and As edges were performed on two series of $In_xGa_{(1-x)}As$ tetragonally strained films epitaxially grown on a InP substrate:

- 7 thin pseupmorphic films, with a concentration x ranging from 25 to 75 at% and with a parallel strain ranging from tensile (+2%) to compressive(-1.5%);

- 4 samples at constant concentration x=25 at% and increasing thickness (from 25 to 2500 nm) with a strain which decreases from 2% to 0.1% by the formation of plastic defects.

The high precision determination of the NN distances (± 0.004 Å) allowed to discover a clear correlation between the macroscopic strain status and the atomistic deformation of the films. In the figure the deformation of the Ga-As NN distances of the strained samples, relative to the same distances in unstrained samples, are plotted as a function of the strain. It clearly appears that this deformation linearly increases with the strain both

for the pseudomorphic, not defected samples (full symbols), and the relaxed, defected samples (open symbols).

This behaviour can be simply understood by a model which applies down to a local scale the macroscopic strain matrix (lines in the figure). This model fully data for both sets od samples.

These results have benn published in the following papers, where a detailed discussion can be found:

-F. Romanato, D. De Salvador, M. Berti, A. Drigo, M. Natali, M. Tormen, G. Rossetto, S. Pascarelli, F. Boscherini, C. Lamberti, and S. Mobilio, Phys. Rev. B **57**, 14619 (1998).

-M. Tormen, D. De Salvador, M. Natali, A. Drigo, F. Romanato, G. Rossetto, F. Boscherini, and S. Mobilio, J. Appl. Physics **86**, 2533 (1999).