



	Experiment title: Study of Bi clustering and Bi-N dimers formation in GaAsBi and GaAsBiN alloys	Experiment number: MA-237
Beamline: BM29	Date of experiment: from: 15/11/2006 to: 20/11/2006	Date of report: 27/02/2007
Shifts: 18	Local contact(s): Gianluca CIATTO	<i>Received at ESRF:</i>
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Report:

The experiment, in spite of the experimental difficulties discussed in the proposal, has been successfully performed at BM29 in the dates reported above, selecting the L2 edge of Bi and using a 13-element Ge hyperpure fluorescence detector in order to separate the Bi Lbeta 1 line from the very intense lines coming from the GaAs substrate (Fig. 1).

Spectra of good quality have been taken on three GaAsBi samples and two GaAsBiN samples (Fig.2).

Nevertheless, serious technical problems with the synchrotron and accumulation ring (booster, radio-frequency cavities, etc.) caused several beam failures that, coupled to

the long times necessary to acquire spectra in fluorescence mode on nanostructures, did not allow us to measure a complete series of sample. In particular, we lack data on a GaBiAs sample with lower Bi concentration (1-1.5%) and on a GaAsBiN sample with N % intermediate between those of the two samples measured (i.e. N = 0.8-1 %). Our data show that the signal seems to change in the ternary sample with the smallest Bi % (1.7 %) (red

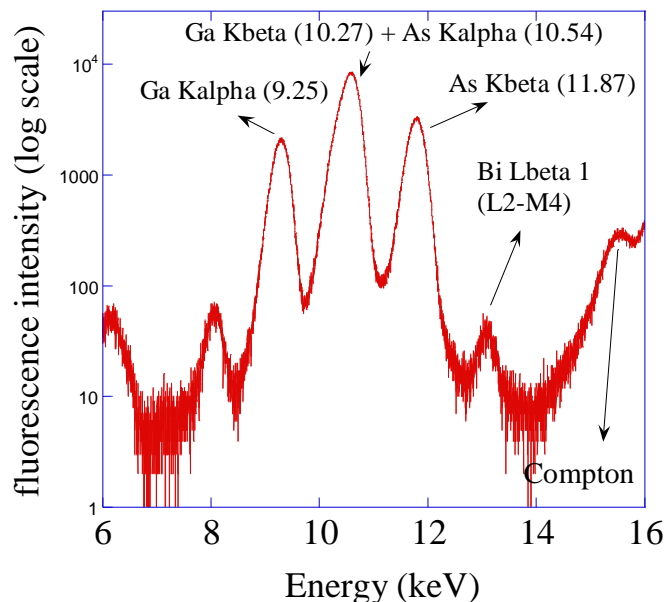


Fig 1: fluorescence spectrum of a GaAsBi sample at 16 keV

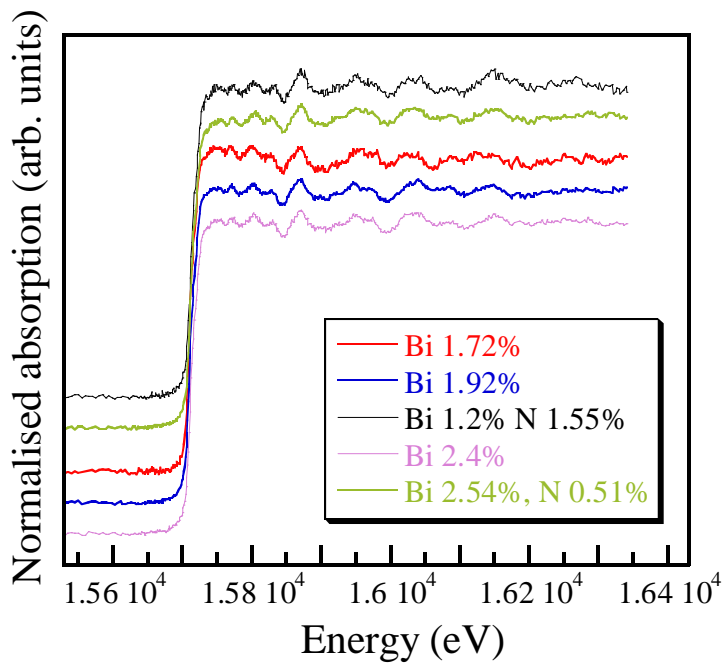


Fig.2 : X-ray absorption spectra at the Bi L2 edge for several GaAsBi and GaAsBiN samples

spectrum), data analysis and simulations are in progress in order to explain the physics of this variation in terms of SRO; the measurement on a sample with Bi concentration of the order 1-1.5 % would be important to understand if such changes in the spectra go on when decreasing the concentration.

Data taken on quaternary GaAsBiN samples show an augmentation of the signal amplitude when N concentration increases from 0.5 % to 1.5 %, due to some effect of N on the local structure which is under investigation; a measurement on a sample with N concentration around 1 % would be very useful in order to understand if the

increase in amplitude depends linearly on the N concentration.

We think that, from the analysis of these data and from a parallel XAFS study which we plan to perform at the N K-edge, we will be able to understand if there is formation of Bi pairs or Bi-N dimers in some of these samples.

Due to the technical problems quoted above, and to a radiation test programmed on the last night of experiment, only roughly 14 shifts of the 18 originally allocated were available.