ESRF	**Experiment title:** EXAFS study of semiconductor-doped composite glasses obtained by double ion implantation	**Experiment number:** CH 694
Beamline: BM08-Gilda CRG	**Date of experiment:** from: 26/11/99 to: 29/11/99	**Date of report:** 28/02/00
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The aim of this experiment was to determine the local order around the species forming semiconductor quantum dots within silica matrix upon sequential ion implantation.
Sequential double implants were performed in fused silica glass of Ga^+ (120 keV) and N^+ (30 keV), Ga^+ (100 keV) and As^+ (100 keV), Zn^+ (140 keV) and Se^+ (160 keV), with fluences in the range from 10^{16} to 10^{17} ions/cm^2. Ion implanted slides were then heat-treated in different (hydrogen, nitrogen) atmosphere.
X-Ray absorption spectroscopy was performed at the Zn, Ga, As and Se K-edges, in order to determine the local order around the species forming nanoaggregates within silica matrix; due to sample dilution (clusters are confined in a surface layer about 100 nm thick), X-ray fluorescence yield detection was used.
In fig. 1 amplitudes of Fourier transform for As^++Ga^+ implanted silica (As and Ga K-edge) are compared with that of cristalline GaAs. The three curves all peak at the same first shell coordination distance: this is an evidence that GaAs nanoclusters are formed. Further analysis is needed to estabilish if amorphous GaAs quantum dots are formed, since Fourier transforms of both Ga and As K-edge EXAFS spectra do not exhibit any other structures at higher distances.
As far as Ga^++N^+ implanted samples are concerned, we found that subsequent annealing in reducing atmosphere promotes formation of GaN clusters. In fig. 2 we report the fit of experimental amplitude of Fourier transform on the hypotesis of crystalline GaN nanoclusters.
Work is in progress to perform quantitative analysis of all the investigated systems; the results will allow us to modelize the process of clusterization in order to develop a preparation protocol for composite glasses containing semiconductor quantum-dots with prescribed optical features.

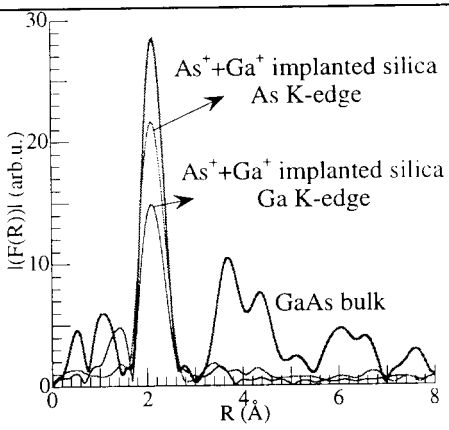
30
20
10
0
|(F(R))| (arb.u.)
As+Ga implanted silica
As K-edge
As+Ga implanted silica
Ga K-edge
GaAs bulk
0
2
4
6
8
R (Å)

fig. 1

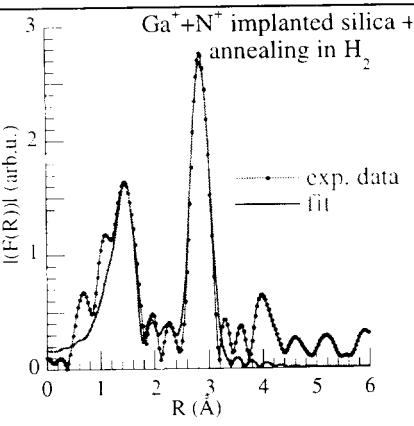
3
2
1
0
|(F(R))| (arb.u.)
Ga+N implanted silica +
annealing in H2
exp. data
fit
0
1
2
3
4
5
6
R (Å)

fig. 2