ESRF	**Experiment title:** Metal alloy nanocluster formation in double-implanted silica glass: a Grazing Incidence Small Angle X-ray Scattering study.	**Experiment number:** HS 964
Beamline: ID10B	**Date of experiment:** from: 15/09/99 to: 20/09/99	**Date of report:** 28/02/00
Shifts: 18	Local contact(s): F. Zontone	*Received at ESRF:*

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The aim of this experiment was to investigate the morphology of silica glass containing metal alloy nanoclusters that are confined in about 150 nm below glass surface. Fused silica slides were implanted at room temperature with sequential Au^++Cu^+, Au^++Ag^+, Cu^++Ni^+ ions , with fluences in the 10^{16} ions/cm^2 range and energies in the 100 keV range such to overlap the implanted species. Ion implanted slides were then heat-treated at temperatures ranging from 400 to 900°C in different (neutral, oxydizing or reducing) atmospheres.

We collected GISAXS patterns scanning a 1-D PSD, so obtaining 2-D scattering patterns. In many of the samples analyzed is evident the intercluster correlation ring. Isotropic scattering patterns were then radially integrated and analized within local monodisperse approximation [1]. With this procedure it was possible to estimate both cluster size distribution and mean interparticle correlation distance depending on different preparation treatments. In fig. 1 scattering curves and fits concerning Au^++Cu^+ implanted samples are reported; clusters size distributions of the same systems are reported in fig. 2 and fitting results on the table below. These results will allow us to construct models to explain both optical absorption for these composite systems and processes that induce clusters formation.

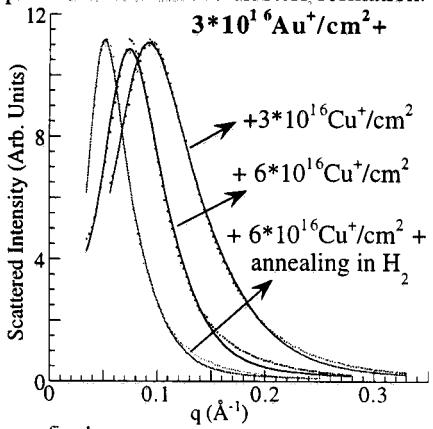

fig. 1

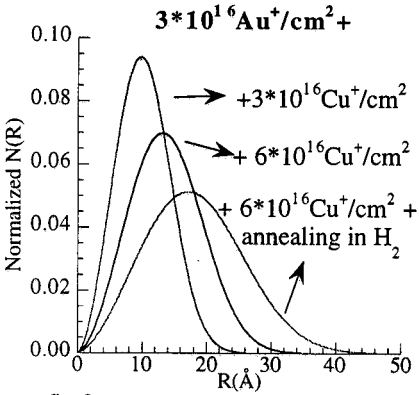

fig. 2

fitting results for Au+ + Cu+ implanted samples:

preparation parameters	mean radius (Å)	interparticle correlation distance (Å)	filling factor
$3*10^{16}Au^{+}/cm^{2}+$ $3*10^{16}Cu^{+}/cm^{2}$	12.0 ± 0.5	65 ± 5	0.05±0.01
$3*10^{16}Au^{+}/cm^{2}+$ $6*10^{16}Cu^{+}/cm^{2}$	16.0 ± 0.5	74 ± 5	0.08±0.02
$3*10^{16}Au^{+}/cm^{2}+$ $6*10^{16}Cu^{+}/cm^{2}+$ H_2 annealing	21.0 ± 0.5	113 ± 8	0.05±0.01

Work is in progress to determine cluster size distributions and intercluster correlation distances of Au^{+}+Ag^{+} and Cu^{+}+Ni^{+} implanted samples.

[1] J. S. Pedersen, JAC **27**, (1994) 595, PRB **47** (1993) 657.