

The aim of the experiment was to investigate the dynamics of Au and Cu nanoclusters (NCs) embedded in the same silica matrix during annealing in oxidizing atmosphere, in particular to investigate the effect of the co-presence of two competitive processes that are the Au-Cu alloying and the Cu-oxidation.

The EXAFS experiment was performed at Cu K-edge and Au LIII-edge on silica slides containing Au and Cu nanoclusters prepared by sequential ion implantation: the implantation energies were chosen to obtain a Cu-doped layer below an Au-doped one. The x-ray absorption spectra were recorded in fluorescence mode at liquid nitrogen temperature, on a set of samples heated for different time intervals at 900C in oxidizing atmosphere. The EXAFS analysis (data processing is still in progress) indicates that:

- In the as-implanted sample mainly only Au and Cu single-metal clusters are present.
- After 15 min. heating a Au-Cu correlation is evident, for both Au- and Cu-edge spectra. The average cluster size increases.
- The Au-Cu coordination becomes more evident for longer annealing duration, and, at the same time, a Cu-O coordination is detected for an annealing time longer than 45 min.
- After 2h annealing large Au clusters are present. Most part of Cu atoms is oxidized; nevertheless, a Cu-Au coordination is still detected, indicating that the de-alloying process is not yet completed.

The further analysis will elucidate if the de-alloying occurs via the formation of core-shell structures.