Experiment 08-01-908

Title: Binary clusters of metals immiscible in the bulk phase: first steps of Au-Co cluster formation in silica.

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Experimental conditions: Au L3-edge and Co K-edge EXAFS spectra. Fluorescence mode, LNT. Monochromator: Si 311.

Samples: Au-Co sputtered layers (30 um thick), Au-Co 2D nanohole arrays, AuCo nanosemishells.

We have measured XAS spectra of 9 samples: considering 2 edges spectra per samples, a total of 18 spectra were recorded: each of them is the average of different acquisition. Data quality was good, allowing a full analysis of the spectra.

Main results of the preliminary analysis:

- Au-Co metastable alloy is detected in nanofilms, nanohole arrays and nanosemishell arrays.
- Segregation of single metal structure evident, involving from 10% to 40 % of metal in the sample, depending on the sample composition.
- Deviation from the virtual crystal approximation detected. Minor part of Co oxide.
- High structural disorder in alloy nanostructures with respect of single-metal structures.

The figure reports the comparison among some of the recorded spectra: