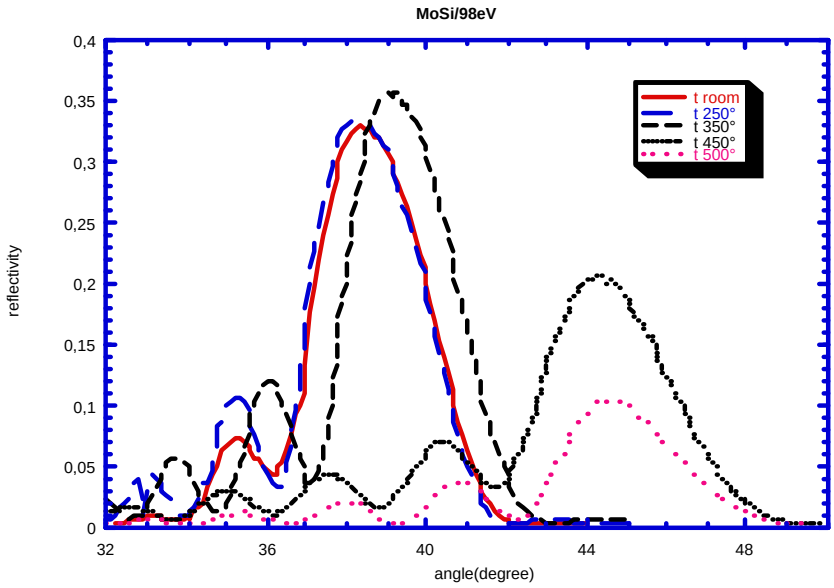
MoSi/98eV
reflectivity
angle(degree)
0,4
0,35
0,3
0,25
0,2
0,15
0,1
0,05
0
32
36
40
44
48
t room
t 250°
t 350°
t 450°
t 500°

Continuous thermal annealing effects on the performances of soft-x-ray multilayer Mo/Si, Mo/C Ni/C mirrors

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In this work we study the effects of continuous thermal annealing on the reflectivity of Mo/Si, Mo/C and Ni/C mirrors.

The three kinds of MIMs have been made by ion sputtering on a silicon substrate. The annealing has been performed in a stainless steal cell evacuated at 10^{-3} torr and set up in an electric furnace. The temperature is raised at a speed of 300°/hour and the temperature of annealing is kept constant during 2 hours. After this delay, the sample is allowed to cool down to room temperature under argon at atmospheric pressure. The reflectivity has been measured versus the glancing angle at a photon energy closed to 100eV using the synchrotron radiation supplied by the Super-ACO storage ring. The measurement has been carried out on the same sample at room temperature and after the annealing process.

The effects of annealing on the different mirrors are very different. The period of the Mo/Si MIM tends to decrease when the annealing temperature increases while the period of the Mo/C MIM remains constant and the period of the Ni/C MIM increases. An example of the evolution of the reflectivity with the annealing temperature is given for the Mo/Si sample in the figure below. The behavior of the Mo/Si MIM is explained by the formation of an interfacial layer of $MoSi_2$. The behavior of the Ni/C MIM has been observed for other types of X/C MIMs with X=W, Pt, V, Cr, Fe, Co, Ru. The problem has been extensively discussed for X=W: agglomeration of the W layer, expansion of the C layer or formation of a composite at the interface have been put forward. The case of Mo/C seems original in this sequence.