STUDY OF THE INNER STRUCTURE AND ITS CHANGES UPON ANNEALING OF CO/C AND NI/C MULTILAYERS PREPARED BY PULSED LASER EVAPORATION METHOD

V.A. Chernov , N.I. Chkhalo , M.V. Fedorchenko , S.V. Mytnichenko , S.G. Nikitenko
Boreskov Institute of Catalysis, Novosibirsk 630090, Russia
Budker Institute of Nuclear Physics, Novosibirsk 630090, Russia
Institute of Solid State Chemistry, Novosibirsk 630128, Russia

The EXAFS (Extended X-ray Absorption Fine Structure), WAXS (Wide- Angle X-ray Scattering) and SAXS (Small-Angle X-ray Scattering) methods were used to study the inner structure of Ni/C and Co/C multilayers produced by the pulsed laser evaporation technology, as well as, the structural changes occurred in the multilayers upon annealing. As the metal film during its deposition is not thicker than about 2 nm it was found to have an amorphous structure. With further thickening of the metal film it acquires a polycristalline nature, and at its thickness over 5 nm it possess the properties of a bulk material. It is followed by an increase in the boundary roughness from 0.3 to 0.55 nm. The thickness of the mixed metal - carbon layer was found to be about 0.4 nm. It was shown that the improvement of the X-ray optical characteristics of multilayers may be achieved at the optimal annealing temperature (about 320 in degrees Celsium) corresponding to the self-epitaxial catalytic resolution of mixed layers. The exceeding of this temperature leads to the bulk crystallization of the metal and increases drastically the boundary roughness.