

Fabrication of EUV and soft X-ray optical elements at IPM RAS

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The Institute for Physics of Microstructures of the Russian Academy of Sciences (IPM RAS) is a branch of Institute of Applied Physics located in the city of Nizhny Novgorod, Russia. The group of X-ray optics working here keeps one of leader positions in Russia in fabrication and characterization of multilayer metal coatings as well as freestanding film samples.

The applied technology is magnetron sputtering. Fabricated coatings are used mainly as effective mirrors of normal incidence in extreme ultraviolet (EUV) and soft X-ray spectral regions. A number of techniques were developed to fabricate transmission type optical elements optimized for specific tasks – spectral purity filters, phase retarders, protective and separating screens. A set of in-lab devices for characterization of produced optical elements includes X-ray and EUV reflectometers equipped either with X-ray tube or plasma source of radiation. There are also the possibilities to use AFM, SEM and secondary ion mass-spectroscopy for structural studies.

Besides items described above, the recent efforts of the group is yet concentrated onto two directions: ion beam polishing and profiling of optical surfaces and comprehensive studies of beryllium as a prospective material for EUV mirrors and filters with a short-wavelength spectral window edge of about 11 nm.