

Fabrication and Surfaces/ Interfaces Studies of Soft X-ray Multilayers for Polarizing Elements

M. Nayak, RRCAT Indore

PhD Supervisor: Dr. G.S. Lodha and Dr. R.V. Nandedkar (RRCAT, Indore)
Prof. S. A. Shivashankar (IISc, Bangalore)

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The quality of surfaces and interfaces play important decisive role in achieving optimum performance of the x-ray multilayer mirror. In the present thesis work, we have systematically carried out surface and interface investigations for different soft x-ray multilayers for the polarizing applications on Indus-1 synchrotron source. The actual performance of the multilayers structure was tested using Indus-1 synchrotron radiation. An ultra high vacuum electron beam evaporation system is indigenously developed for the fabrication of soft x-ray multilayers. Also we have carried out detailed thin film growth study of Mo films for optimum performance in Mo-based multilayer structures. In addition, we have presented the possibility of determining interlayer composition at buried interface using soft x-ray resonant reflectivity using Indus-1 synchrotron source. We also provide experimental evidence of elemental specificity property of soft x-ray resonant reflectivity through the affect of anomalous optical constants on angle dependent x-ray reflectivity tuning photon energy at the absorption edge of the constituent element.