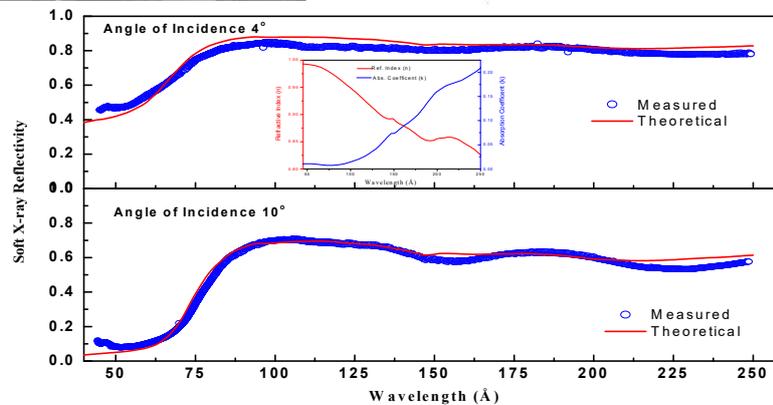
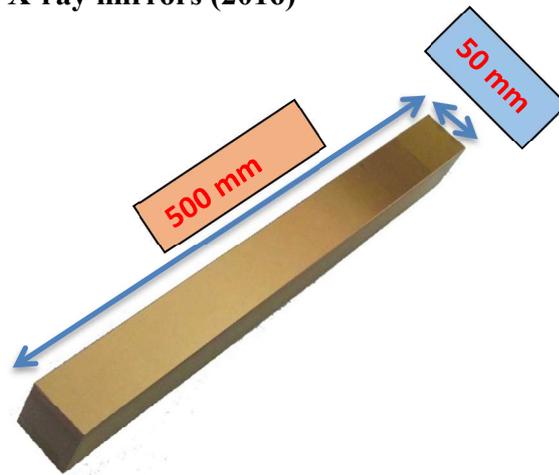
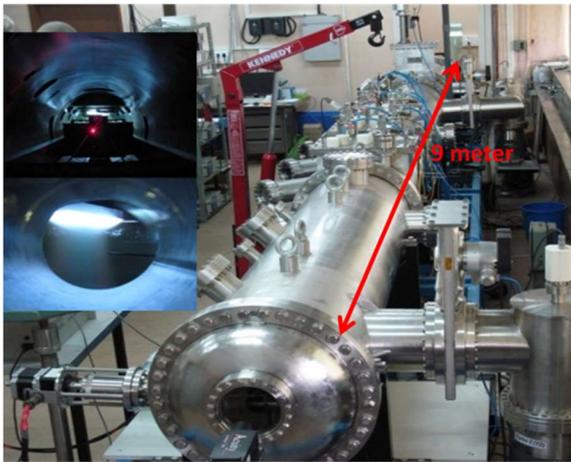


- Development of grazing incidence X-ray mirrors (2016)



Indus synchrotron complex in India is using a large number of synchrotron mirrors for different purposes in different experiments viz., for rejection of higher harmonics from the Synchrotron beam, for reducing the heat load on the monochromators etc. X-ray mirrors are available commercially from very few international sources and thus are extremely cost intensive. Also since these mirrors are exposed to very bright Synchrotron radiation with high heat load, there are distinct possibilities of damage in the coating. A comprehensive in-house facility for development of these hard X-ray mirrors with indigenous technologies therefore, would provide long-term support to the Synchrotron Radiation based programme of the country. With this goal in mind, a 9 meter long cylindrical magnetron sputtering coating system has been developed in-house in which uniform deposition of thin films and multilayers on substrates up to 1500 mm x 150 mm size can be carried out (top panel left). In the system, a UHV compatible S.S. rope based motorized pulley is used to move the substrate tray several times to and fro at the bottom of a cathode during deposition so that uniform coating over a large area is achieved, while a laser tracker is used to monitor the position of the substrate at any instant inside the deposition chamber. The system is equipped with all necessary vacuum and deposition monitoring gadgets, is fully software controlled and is capable to deposit single & multilayer films on substrates of upto 1.5 m length and large number of layers can be deposited in the system without any manual intervention. The system has been used to develop Cr/Au based synchrotron mirrors, for beamlines at Indus-1 synchrotron source. Several mirrors of different sizes on flat (500 mm X 51 mm X 51 mm) (top panel right) and spheroidal (300 mm X 51 mm X 47 mm) zerodour substrates have been coated in the facility which have shown remarkable spectral characteristics with reflectivity closed to theoretical limit (bottom panel) and are being successfully used in the beamlines.