Multilayer Optics for Hard X-ray Astronomy

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We are engaged in a program to develop focusing hard X-ray optics for future X-ray astronomy missions and have built a DC magnetron sputtering system to deposit multilayers on candidate substrates for future telescopes (such as the Hard X-ray Telescope of the Constellation X-ray mission, which is expected to be NASA's next major initiative in X-ray astronomy). Emphasis is on the multilayer coating of integral cylindrical optics which will provide the highest spatial resolution. A system has been designed to allow for the uniform coating of the inside surface of integral cylinders. We present specular reflectivity data (using CuK_α X-rays) of constant d and depth graded-d multilayer depositions on test substrates such as silicon wafers, thermally formed DESAG glass and Duran glass cylinders. Azimuthal and linear uniformity of the coatings will be discussed.