

Supermirrors for 1-10 keV for high resolution X-ray Imaging plasma diagnostic

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ABSTRACT

Our laboratories develop advanced High Resolution X-ray Imaging microscopes for diagnose laser produced plasma used for Inertial Confinement Fusion (ICF) research.

We have developed non-periodic W/SiC multilayer mirrors ("Supermirrors") specifically designed to reflect energy photons between 2-10 keV. The mirrors were designed at the Commissariat à L'Energie Atomique (CEA-DIF) in collaboration with the Laboratoire Charles Fabry de l'Institut d'Optique (LCFIO) where multilayers have been optimized with home made calculation code. Super mirrors are designed to work at 0.7° grazing incidence with a reflectivity above 35 % in almost the entire energy range 2-10 keV. The multilayers have been deposited by magnetron sputtering. Grazing-incidence X-ray reflectance at 8 keV and PTB synchrotron radiation for x-ray reflectance in the all range were used both in order to characterize the multilayers (thicknesses, indices, roughnesses). The experimental results show good agreement with theoretical computations.

We will present the imaging studies performed with an X-ray generator and an X-ray imaging system composed of a single toroidal mirror.

We have also studied other systems of super mirrors in this range.