

Sputter deposition of x-ray multilayers

Ch. Morawe

European Synchrotron Radiation Facility
BP 220, F-38043, Grenoble Cedex, France
Tel. xx33-4-7688-2588, Fax. xx33-4-7688-2218, e-mail: morawe@esrf.fr

Abstract

Among all deposition techniques which are currently being used to fabricate various kinds of thin films or multilayers, non-reactive sputtering is probably the most frequent. It has seen a rapid development during the last few decades and finds its applications in basic research as well as in industrial production lines. The method is relatively “handy”, efficient, and does not require extreme working conditions. It offers specific advantages compared to classical thermal evaporation. Relatively high particle energies lead to high film densities and sharp interfaces. Large substrate areas can be coated with good uniformity and repeatability. However, there remains a variety of deposition parameters that need to be considered and adapted to the particular fabrication goal.

In this talk, I want to give a short introduction into the sputtering process and the consequences affecting the growth of thin films and multilayers. I would like to place particular emphasis on the fabrication of large scale multilayers and the practical obstacles one has to overcome. One of the critical tasks is the deposition of laterally graded multilayers which play an important role in modern x-ray optics. I want to present properties and performance of state-of-the-art sputtered x-ray multilayers and, finally, I would like to discuss future developments and limitations of the sputtering technique.