

Design, Development and characterization of thin film filters for high brilliance sources in the UV-X-ray Spectral range.

Kety Jimenez

Padova University, information engineering department

High brilliance sources such as synchrotron and Free Electron Laser (FEL) are very important nowadays due to their multiples application in the development of science and technology. One strong requirement on the beam delivered by these sources besides brilliance, coherence and bandwidth is often related to the spectral purity; in fact, the beam can be the superposition of various harmonics. The rejection of high harmonics or diffuse light in order to improve the quality of the beam can be achieved by suitable optical systems acting as band pass filters [1-7].

Since materials present high absorption in the EUV spectral range, the selection of devices acting as filters in order to select suitable spectral bandwidth or reject harmonics is quite challenging. This project will be focused in the searching for potential materials, design, fabrication and characterization of self standing transmittance thin films filters between 4-20 nm and 20-100nm spectral range, which correspond to intervals into the Extreme Ultraviolet and soft- x ray spectra Region, to be inserted along Synchrotron and Free Electron Laser (FEL) transport optics.

Some properties like fragility, resistance against oxidation and carbonation of the films and resistance to the high power of these light sources have to be taken in consideration.

References:

1. Hatayama et al., Japanese Journal of Applied Physics, 48, 2009.
2. M Fernandez Perea et al., Proc. SPIE 7101 (2008).
3. Gann et al., RSI 83, 045110 (2012).
4. Saitoh et al., RSI 71, 9 (2000).
5. Mckinney et al.,RSI 66 2160 (1995)
6. Underwood et al., Journal of Electron Spectroscopy and related phenomena, 92, 265 (1998).
7. F. Bencivenga et al., New Journal of Physics 15 (2013).