EUV Multilayers Mirrors – Wider, Thinner and Deeper (Keynote)

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The state-of-the-art Mo-Si multilayer mirrors (MLM) used for EUV optics are moving ever so close to their theoretical limits. Interface engineering, the atomic-level control of what happens at the edge between two layers of MLMs, has allowed achieving reflectivities of more than 70% at 13.5nm and over 65% for 6.6 nm wavelengths. However, these MLMs still have some physical limitations in terms of angular and energy bandwidth. In this presentation we show both designs and actual mirrors that can overcome these limitations, including analysis of where layer and interface properties become critical for mirrors. To reach far beyond EUV, we also show applications of MLM's all the way to the soft X-ray range, and confirm that even there, the atomistic interface engineering is still key to understand and achieve high reflectivities.

Presenting Author

Marcelo Ackermann is chair of the Industry Focus Group – X-ray and EUV (XUV) optics at the MESA+ institute of University of Twente. He obtained his PhD in physics (cum laude) in 2007 on a shared research project between Leiden University and the ESRF in Grenoble, under the guidance of Prof J.W.M Frenken and Prof. S. Ferrer. After that held different leading positions in industrial research for the development of X-ray, visible and IR optics for companies like cosine Research, Helbling Technik, SCHOTT Advanced Optics and ASML. In 2020 he re-joined academic research as full professor in the XUV optics group, focussing on the development of next generation reflective, refractive and transparent X-ray and EUV optics in collaboration with industrial partners like Zeiss SMT, ASML and Malvern Panalytical.