

Seminar Series

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High Aspect Ratio Polymer and Metal Patterning at the Synchrotron Laboratory for Micro and Nano Devices (SyLMAND), Canadian Light Source

Deep X-ray lithography (XRL) complements other micro and nano fabrication processes available in Canada. While many patterning processes traditionally target highest lateral resolution in shallow films and often focus on silicon materials, XRL is commonly optimized for the patterning of thick resist layers (typically, up to hundreds of micrometers or even millimeters) with high aspect ratios (ratio of thickness to minimum lateral feature size; up to 100:1), and smooth and vertical sidewalls, at reduced requirements on lateral resolution. XRL can be combined with subsequent process steps of the LIGA process (German acronym for lithography, electroplating, and replication) to obtain a wider variety of patterned materials (including polymers, metals and ceramics) and to reduce the cost per patterned component by mass replication rather than individual lithography. In Canada, XRL has recently become available to the scientific community and to industrial users as SyLMAND, the Synchrotron Laboratory for Micro and Nano Devices of the Canadian Light Source (CLS) in Saskatoon, became operational.

The talk will give a brief introduction to XRL processing, explain some of SyLMAND's unique contributions to XRL instrumentation and technology, and highlight selected applications in the areas of vertical wall radio frequency (RF) MEMS and antennas, X-ray optics, and fluidics.



Dr. Sven Achenbach (M'11) received the B.Sc. and M.Sc. (1996) as well as the P.D. (2000) degrees in mechanical engineering from the University of Karlsruhe, Germany.

Following several Research Assistant positions and a research stipend at the National Research Center CNRS-LURE, Paris, France, he was a Post Doctoral Fellow at the Research Center Karlsruhe, Germany (2000 to 2003), focusing on deep X-ray lithography process technology. In 2003, he was awarded a tenured Research Scientist position at the Institute of Microstructure Technology in Karlsruhe. In 2005, he assumed an Associate Professorship in the Department of Electrical and Computer Engineering, University of Saskatchewan, Canada, where he was promoted to Full Professor in 2009 and was appointed as a TR Labs Adjunct Scientist. His research interests include instrumentation and process development for polymer- and metal-based micro- and nano devices and applications

such as RF-MEMS, optics, and micro/nano fluidics. In the past decade, he has conceptualized and developed the Synchrotron Laboratory for Micro and Nano Devices (SyLMAND), Canada's deep X-ray lithography facility at the Canadian Light Source CLS, where he is a Beam Team Leader and Principal Investigator. He is the author of a book chapter, a patent, and more than 60 articles. Dr. Achenbach was the recipient of the Forschungszentrum Karlsruhe "Excellent Young Scientists" award and tenured position (2003) and was appointed as the Canada Research Chair in Micro and Nano Device Fabrication (2005-2015).