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Functional ultra-thin oxide films deposited by atomic layer deposition on structured substrates — •Carlos Morales[1], Ali Mahmoodinezhad[1], Andreas Markus Schubert[2], Christian Wenger[2], Karsten Henkel[1], and Jan Ingo Flege[1] — [1]Applied Physics and Semiconductor Spectroscopy, Brandenburg University of Technology Cottbus-Senftenberg, Konrad-Zuse-Strasse 1, D-03046 Cottbus, Germany — [2]IHP - Leibniz-Institut für innovative Mikroelektronik, IHP, Im Technologiepark 25, 15236 Frankfurt (Oder), Germany

In the last decades, atomic layer deposition (ALD) has gained prominence in the materials and surface science communities owing to its high potential for integration as a scalable process in microelectronics. ALD's largest strengths are its well-controlled layer-by-layer deposition and growth conformity on 3D structures. Yet, the ALD technique is also well known to lead to amorphous and defective, non-stoichiometric thin films, resulting in modified materials properties that may even preferentially be used in certain applications. To study these issues, we have developed an in-situ ALD reactor attached to an X-ray photoelectron spectroscopy (XPS) system, capable of switching between both pump and flow-type operation. This novel tool allows to cover the entire range of compounds and recipes used in ALD, thus clarifying the role of such defects at different deposition stages, growth conditions and film/substrate interfaces. To exemplify these sorts of studies, we show the deposition of Al2O3 5-10 nm films on nanostructured Si, and their use as substrates for functional CeOx ALD deposits.

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