ALD Precursor Chemistry: Synthetic Routes, Purification and Evaluation of Precursors

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An open challenge for forefront research is provided by innovative strategies based on the synergic combinations of precursor chemistry and material synthesis, opening new horizons for the development of advanced functional material systems. In the case of atomic layer deposition (ALD), the important figure of merit is the precursor. High volatility, reactivity and thermal stability are the main requirements for an ALD process. But several precursors do not possess all of these characteristics. Thus, the search for alternative precursors continues to grow to overcome the drawbacks associated with the well-established or commercially available precursors in order to meet the stringent demands for modern technological applications. The reports on the design of new precursors by systematic and logical variation of the ligand sphere remains a rare occurrence in literature. Apart from identifying new and suitable precursors for ALD, it is also important that the precursors can be synthesized and scaled up to larger batches, they are non-toxic and the purity of the product is of high relevance. In this presentation, the approaches taken to synthesize different classes of precursors, their purification and the methods employed to characterize them will be discussed. The focus will be on representative precursors for metals and metal oxides and evaluating the precursor purity, volatility, thermal stability relevant for ALD applications.