

# Atomic Layer Deposition of Lanthanide Oxides: Exemplified by Europium Oxide

Per-Anders Hansen, T. Finstad, H. Fjellvåg, and O. Nilsen

**Abstract** Lanthanide oxides are important components in a range of optoelectronic materials such as lasers, diodes and light conversion materials. We have investigated the possibilities to use atomic layer deposition (ALD) for deposition of thin films of the  $\text{Ln}_2\text{O}_3$  ( $\text{Ln} = \text{Pr, Nd, Sm, Eu, Tb, Dy, Ho, Er, Tm, Yb}$ ) systems using the precursor combinations  $\text{Ln}(\text{thd})_3 + \text{O}_3$  ( $\text{thd} = 2,2,6,6\text{-tetramethyl-3,5-dionato}$ ). The advantage of ALD is the possibilities of mixing different materials at the atomic level and at relatively low temperatures. This opens for synthesis of many new materials where controlled intermixing of elements is important. The results from this work have been used to deposit down conversion films based on europium doped titanium oxide.

---

P.-A. Hansen (✉) • H. Fjellvåg • O. Nilsen  
Centre for Materials Science and Nanotechnology, Department of Chemistry, University of Oslo,  
Blindern, P.O.Box 1033, Oslo 0315, Norway  
e-mail: [p.a.hansen@kjemi.uio.no](mailto:p.a.hansen@kjemi.uio.no)

T. Finstad  
Department of Physics, University of Oslo, Blindern, P.O.Box 1033, Oslo 0315, Norway