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Growth of Erbium doped Yttrium oxide thin films by atomic layer deposition NICHOLAS BECKER, THOMAS PROSLIER, J. KLUG, J. ELAM, Argonne National Laboratory, T. SANAMYAN, M. DUBINCKII, J. GIROLAMI, M. PELLIN, Argonne National Laboratory — Er-doped Yttrium oxide (Er^{3+}:Y_2O_3) has gained recent attention for its possible use in optoelectronic devices. Here we report the use of atomic layer deposition (ALD) to synthesize thin films of Yttrium oxide with various doping levels of Erbium ions (Er^{3+}) using different chemistries. ALD uses self-limiting surface reactions to deposit highly conformal thin films over large areas and substrates of arbitrary shape. This allows for the uniform layered doping of Yttrium oxide with Er^{3+}. The spatial separation of the Erbium ions can be controlled using organometallic precursors with varying ligand sizes. The doping concentration (volume ratio of Er^{3+} sites to Y^{3+} sites) is controlled by the ratio of the precursor pulses. We comprehensively studied ALD-grown films of Er^{3+}:Y_2O_3 obtained from the Erbium precursors $Er(MCp)_3$ and $Er(BA)_3$ and the Yttrium precursors $Y(MCp)_3$ and $Y(Cp)_3$ using either water or hydrogen peroxide as an oxygen source. Detailed description of the studied optical and spectroscopic properties, stoichiometry, and physical characteristics of these films will be presented.

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