

**Title:**

Cr<sub>2</sub>O<sub>3</sub> thin films grown at room temperature by low pressure laser chemical vapour deposition

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**Abstract:** Chromia (Cr<sub>2</sub>O<sub>3</sub>) has been extensively explored for the purpose of developing widespread industrial applications, owing to the convergence of a variety of mechanical, physical and chemical properties in one single oxide material. Various methods have been used for large area synthesis of Cr<sub>2</sub>O<sub>3</sub> films. However, for selective area growth and growth on thermally sensitive materials, laser-assisted chemical vapour deposition (LCVD) can be applied advantageously.

Here we report on the growth of single layers of pure Cr<sub>2</sub>O<sub>3</sub> onto sapphire substrates at room temperature by low pressure photolytic LCVD, using UV laser radiation and Cr(CO)<sub>6</sub> as chromium precursor. The feasibility of the LCVD technique to access selective area deposition of chromia thin films is demonstrated. Best results were obtained for a laser fluence of 120 mJ cm<sup>-2</sup> and a partial pressure ratio of O<sub>2</sub> to Cr(CO)<sub>6</sub> of 1.0. Samples grown with these experimental parameters are polycrystalline and their microstructure is characterised by a high density of particles whose size follows a lognormal distribution. Deposition rates of 0.1 nm s<sup>-1</sup> and mean particle sizes of 1.85 μm were measured for these films. (C) 2011 Elsevier B.V. All rights reserved.

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