Title:
Cr2O3 thin films grown at room temperature by low pressure laser chemical vapour dep osition

Author(s): Sousa, P. M.[3,4]; **Silvestre, A. J.**[1,2]; Conde, O.[3,4]

Source: Thin Solid Films **Volume:** 519 **Issue:** 11
Pages: 3653-3657 **DOI:** 10.1016/j.tsf.2011.01.382 **Published:** Mar 31 2011

Abstract: Chromia (Cr2O3) 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 Cr2O3 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 Cr2O3 onto sapphire substrates at room temperature by low pressure photolytic LCVD, using UV laser radiation and Cr(CO)(6) 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(-2) and a partial pressure ratio of O-2 to Cr(CO)(6) 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(-1) and mean particle sizes of 1.85 mu m were measured for these films. (C) 2011 Elsevier B.V. All rights reserved.

Document Type: Article

Language: English

Author Keywords: Chromium Oxide; Thin Films; Low Pressure Laser-Assisted Chemical Vapor Deposition; Particle Size Distribution; X-ray Diffraction; Raman Spectroscopy

KeyWords Plus: Chromium-Oxide Films; Magnetic-Properties; Nanophase CR2O3; Phase-Control; X-Ray; Oxidation; Polycrystalline; Hexacarbonyl; Diffraction; CR(CO)6

Reprint Address: Silvestre, AJ (reprint author), Inst Super Engn Lisboa, R Conselheiro Emidio Navarro 1, P-1959007 Lisbon, Portugal.

Addresses:
1. Inst Super Engn Lisboa, P-1959007 Lisbon, Portugal
2. ICEMS, P-1959007 Lisbon, Portugal
3. Univ Lisbon, Fac Ciencias, Dept Fis, P-1749016 Lisbon, Portugal
4. ICEMS, P-1749016 Lisbon, Portugal

E-mail Address: asilvestre@deq.isel.ipl.pt

Publisher: Elsevier Science SA
Address Publisher: PO BOX 564, 1001 Lausanne, Switzerland

IDS Number: 747QB
ISSN: 0040-6090