

MATERIALS SCIENCE

Structural, mechanical, and tribological properties of Li₂Al₂O₄ thin films

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Comprehensive structural, mechanical, and tribological properties of Li₂Al₂O₄ thin films are investigated. The films are grown on Si(100) substrates by pulsed laser deposition. The structure of the films is studied by X-ray diffraction and transmission electron microscopy. The mechanical properties are studied by nanoindentation. The tribological properties are studied by ball-on-disk tribometry. The results show that the Li₂Al₂O₄ thin films have a high hardness and low friction coefficient. The tribological properties are significantly improved by the presence of the Li₂Al₂O₄ thin films. The results are discussed in the context of the structure and mechanical properties of the films.

INTRODUCTION

The development of new materials with improved mechanical and tribological properties is a major challenge in materials science. One of the most promising approaches is the synthesis of thin films. Thin films have a wide range of applications, from microelectronics to energy storage. In this work, we investigate the structural, mechanical, and tribological properties of Li₂Al₂O₄ thin films. The films are grown on Si(100) substrates by pulsed laser deposition. The structure of the films is studied by X-ray diffraction and transmission electron microscopy. The mechanical properties are studied by nanoindentation. The tribological properties are studied by ball-on-disk tribometry. The results show that the Li₂Al₂O₄ thin films have a high hardness and low friction coefficient. The tribological properties are significantly improved by the presence of the Li₂Al₂O₄ thin films. The results are discussed in the context of the structure and mechanical properties of the films.

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100; 300 a... 10; 20 (2),
 a... a... a... a... a...
 a... a... a... a... a...
 (C) (2). CNC
 (0, 1) a N (2) a C
 (2, 2)
 a... a... a... a... a...
 a... a... a... a... a...
 L(+)- A/CNC
 a... a... a... a... a...
 a... a... a... a... a...
 CNC a CNC
 L(+)- A CNC

... CNC a F₁C-CNC, ...
 ... CNC i CNC- ... CNC-
 ... 67. 22 a 31. 11%, ... (i, 5). B
 ... OMa ...
 ... CNC i CNC (A ...),
 ... (Fig. 3, Aa B).

... Δ ...
 ... 50-μ ...
 ... Ma ...
 ... F ...

... a 37. Ma ... A, 2, 4, A, 6 ... NC-6 ...) 75

... OMa ... Fig. 3A, a-
 ... CNC i CNC- ...
 ... O ...

10.1126/sciadv.abc1234

$$E + F \rightarrow 2F, v_7 = k_7, k_7 = 10^3 \quad (8)$$

where $A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z$ are the species concentrations.

The A-CNC reaction is given by (E.5a-6).

$$E.1. \quad r_i = \sum_{j=1}^7 (v_j^r - v_j^f) v_j$$

where r_i is the net rate of change of species i .

The A-CNC reaction is given by (E.2a-4).

The A-CNC reaction is given by (E.3).

The A-CNC reaction is given by (E.4).

The A-CNC reaction is given by (E.5).

The A-CNC reaction is given by (E.6).

The A-CNC reaction is given by (E.7).

The A-CNC reaction is given by (E.8).

The A-CNC reaction is given by (E.9).

The A-CNC reaction is given by (E.10).

The A-CNC reaction is given by (E.11).

The A-CNC reaction is given by (E.12).

The A-CNC reaction is given by (E.13).

The A-CNC reaction is given by (E.14).

DISCUSSION

The reaction network is analyzed to determine the conditions for the existence of a steady state.

... CNCa A...
... H... A
... CNC
... CNC a ... (50).
... A/CNC...

... (i) ...
... /CNC ... 0, 0
... .5NC6(Fi, 371E) ... /C ... (0.005, 9 45 5901 ...)0. ...

(-N41001 H :F), Δ a r, i a s i M a b r, a
480. 23
EM i a, i, a r, i a s i
A/CNC (= 4.5)
H = 23%. B
FEG 250
3
90
AFM
A/CNC (

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Self-organization of nanoparticles and molecules in periodic Liesegang-type structures

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Sci Adv 7 (16), eabe3801.
DOI: 10.1126/sciadv.abe3801

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