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Investigation of plasma dynamics effect on the properties of the vanadium oxide thin films

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Abstract :

This study presents the influence of the plume expansion dynamics on the properties of the vanadium oxide thin films. The plume expansion dynamics study have been carried out on vanadium-oxygen plasma generated using 248 nm, 25 ns pulses from an excimer KrF laser under oxygen atmosphere at the laser fluence of 2 Jcm^{-2} using VO₂ pellet. Vanadium oxide thin films have been deposited on a corning glass substrate by ablating a VO₂ pellet at the same conditions of oxygen pressure and laser fluence used for the plasma study. The substrate temperature was fixed at 500 oC and target-substrate distance was determined using the plasma plume results. We successfully deposited pure monoclinic rutile-typed VO₂ (M) phase at 0.05 mbar for 30 mm and 0.01 mbar for 30 and 38 mm. A pure orthorhombic V₂O₅ phase was successfully deposited at 0.1 mbar of 27 and 34 mm. A mixture of vanadium oxide phases was found at 0.2 mbar for 29 mm and at 0.05 mbar for 35 mm. Scanning electron microscopy and atomic force microscopy indicated nanostructures for the monoclinic rutile-typed VO₂ (M) phase and nano-wire and nano-plate for the V₂O₅ phase.

Award :

Yes

Level :

PhD

Supervisor :

Prof. Andrew Forbes (AForbes1@csir.co.za)CSIR National Laser Centre and Univerisity of Kwazulu-Natal

Paper :

No

Primary authors : Ms. MASINA, Bathusile (CSIR, University of KwaZulu-Natal)

Co-authors : Mr. LAFANE, Slimane (Centre de Developpment des Technologies Avanciees Cite) ;
Dr. ABDELLI-MESSACI, Samira (Centre de Developpment des Technologies Avanciees) ;
Dr. WU, Lorinda (CSIR) ; Prof. FORBES, Andrew (CSIR) ; Dr. KERDJA, Tahar (Centre de
Developpment des Technologies Avanciees Cite)

Presenter : Ms. MASINA, Bathusile (CSIR, University of KwaZulu-Natal)

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