

Accepted Manuscript

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PII: S0167-577X(18)30307-0
DOI: <https://doi.org/10.1016/j.matlet.2018.02.093>
Reference: MLBLUE 23919

To appear in: *Materials Letters*

Received Date: 21 November 2017
Revised Date: 17 January 2018
Accepted Date: 19 February 2018

Please cite this article as: X. Gao, M. Hu, Y. Fu, D. Wang, D. jiang, L. Weng, W. Liu, J. Sun, MoS₂-Sb₂O₃ film exhibiting better oxidation-resistance in atomic oxygen environment, *Materials Letters* (2018), doi: <https://doi.org/10.1016/j.matlet.2018.02.093>

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MoS₂-Sb₂O₃ film exhibiting better oxidation-resistance in atomic oxygen environment

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Abstract: The microstructure and wear resistance of sputtered MoS₂ films can be improved by adding some amount of metals. However, the oxidation-resistance of MoS₂-metals films would be worried because some metals are sensitive to atomic oxygen (AO). In this paper, the inert Sb₂O₃ was introduced into the MoS₂ film, and its effect on the structure and anti-oxidation ability of the MoS₂ film was clarified. XRD and SEM results revealed that due to the addition of Sb₂O₃, the growth of MoS₂ micro-platelets was almost suppressed, and so the composite film was amorphous and very compact. XPS analysis indicated that for the composite film, the influence by the AO irradiation was restricted into the film surface layer. Namely, the composite film exhibited a better anti-oxidation ability in the AO environment.

Keywords: Physical vapour deposition; Thin films; Structural; Atomic oxygen; Oxidation

1. Introduction

Sputtered MoS₂ films have been widely used as solid lubricants in space technology, but the wear resistances are limited due to the characteristic porous columnar microstructure [1]. Therefore, different metals have been introduced into the

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