OR1901

A source of atomic oxygen for reactive magnetron sputter deposition of oxide thin films.

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The ultimate goal of our work is to contribute towards the understanding of the role of atomic oxygen on the growth mechanism of reactivly magnetron sputtered metal oxide thin films. To achieve this goal, we are developing an experimental set up that should allow us to synthesize oxide thin films from a source of atomic oxygen [1]. To develop the source of atomic oxygen, we choose to use a surfaguide microwave discharge operating at 2.45 GHz in order to dissociate molecular oxygen in a controlled way. In the present case, we explored the working parameters space and the dissociation efficiency of O_2 was monitored by Two-photon Absorption Laser-Induced Fluorescence (TALIF). The measurements were carried out in the post-discharge. The main advantage of this technique is to give access to the ground-state population of the O atoms by using 225.6 nm photons [2]. Because TALIF doesn't give the absolute density of atomic oxygen, a calibration, thanks to NO titration, was used prior to TALIF measurements [3]. Once the calibration was done, the following parameters were varied systematically: mean power, Ar/O2 ratio, total flow and pulsed effect (DC and pulsed mode). According to our study, a maximum in the production of atomic oxygen can be found e.g. as a function of the Ar/O2 gas mixture. In order to understand the influence of the Ar concentration, the metastable argon (Arm) density was also measured with LIF while varying the microwave discharge parameters.

1. L. Hergot et al, MIATEC-RSD 2015, 8-11 december 2015, Paris, France
2. A F H van Gessel et al., Plasma source Sci. Technol. 22 (2013) 055010
3. A. Ricard et al., Plasma Process. Polym. 4 (2007) S965-S968

Keywords
Microwave discharges
Atomic oxygen
TALIF
NO Titration
Densities