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Avoiding Target Poisoning in Reactive Magnetron Sputtering Depositions at Oblique Angles

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Target poisoning in reactive magnetron sputtering (rMS) deposition of thin films is an undesired phenomenon that leads to a significant drop of the process efficiency and the growth rate. It is also responsible for the appearance of hysteresis phenomena and reactor instabilities that may lead to quite different growth conditions upon fluctuations of process parameters. In this presentation we show a versatile and easy to implement method that, relying on the oblique angle geometry, overcomes the aforementioned drawbacks and enables the growth of stoichiometric and sub-stoichiometric materials by rMS in the non-poisoned mode of the target. The possibility to operate in non-poisoned conditions permits to achieve growth rates that outmatch those found when the classical approach is followed, i.e. when using a higher flux of reactive gas and a poisoned target. This method can also be exploited in rMS depositions to tune the film stoichiometry. We have employed amorphous TiO_x, although the presented results can be easily extrapolated to other materials and conditions. It is found that the proposed method improves 400% the growth rate of TiO_2 thin films.

Keywords
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Stoichiometry Control
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