

Magnetron Sputtering with a Hot Niobium Target

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Abstract:

Hot Magnetron Sputtering (HMS), a technique that uses a non-cooled target, allows increasing the film deposition rate in comparison with “traditional” Cold Magnetron Sputtering (CMS) when the sputtered target is cooled during the process and the applied power density is limited. Enhancement of the deposition rate allows improving the production rate, particularly, when the films should be uniformly deposited onto moving samples, e.g. powders.

In the present study, the applied power density was increased up to 37 W/cm² during HMS and the deposition rate of about 0.1 μm/min is achieved. Time-resolved optical emission spectroscopy allowed to monitor the target heating process along with the plasma composition, reflecting the increased number of emitted thermoelectrons in the HMS case. In addition, the structural changes in the deposited films were revealed based on their analysis via scanning electron microscopy and X-ray diffraction.

Keywords: magnetron sputtering, hot target, deposition rate, niobium, OES, XRD.

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