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# Reactive sputter magnetron reactor for preparation of thin films and simultaneous *in situ* structural study by X-ray diffraction

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## ABSTRACT

The purpose of the designed reactor is (i) to obtain polycrystalline and/or amorphous thin films by controlled deposition induced by a reactive sputtering magnetron and (ii) to perform a parallel *in situ* structural study of the deposited thin films by X-ray diffraction, in real time, during the whole growth process. The designed reactor allows for the control and precise variation of the relevant processing parameters, namely, magnetron target-to-sample distance, dc magnetron voltage, and nature of the gas mixture, gas pressure and temperature of the substrate. On the other hand, the chamber can be used in different X-ray diffraction scanning modes, namely,  $\theta$ - $2\theta$  scanning, fixed  $\alpha$ - $2\theta$  scanning, and also low angle techniques such as grazing incidence small angle X-ray scattering and X-ray reflectivity. The chamber was mounted on a standard four-circle diffractometer located in a synchrotron beam line and first used for a preliminary X-ray diffraction analysis of AlN thin films during their growth on the surface of a (100) silicon wafer.

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