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Development of a magnetron sputtering system for in-situ deposition of thin multilayerscoatings.

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Abstract : In house Physical Vapor DepositionDualMagnetron Sputtering System (PVD-DMSS) was designed and manufactured based on basis criteria, relevant on R&D and industrial systems, and on the feedback experience acquired from operation of an old classical physical vapor deposition system of our laboratory. Its permit to elaborate in situ multilayer's thin films without breaking vacuum and with varying several operation parameters, namely the inter-electrode distance, substrate rotation, polarization and the heating of substrate. The sputtering chamber of developed PVD-DMSS has a volume of about 10 liter; equipped with many accesses (for loading/unloading of samples, for the control of operation parameters and for the installation of diagnosis instruments). The PVD-DMSS is also equipped with two planar balanced magnetron cathodes providing magnetic field of 400mT, the cathodes can be powered by either a radiofrequency alternative current or continuous current, and connected to a high vacuum system. Monolayer's and multilayer's Nickel and Titanium thin films obtained and the results of plasma diagnosis make obvious that the PVD-DMSS developed allows a good level of operation flexibility as well as obtaining reproducible thin films and multilayer with a desired quality.

Keywords : Magnetron sputtering, thin film, plasma diagnostic, PVD system design