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Plasma drift effect in dual magnetron – fundamental properties and implications

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The dual magnetron (DM) is an advanced sputtering system which is effectively used for the deposition of thin films, particularly oxides and multiphase coatings. Magnetic field of the DM plays an important role in the plasma generation and can be realized in two main configurations – either in the mirror or in the closed magnetic field configuration [1]. The configuration of the magnetic field strongly influences the plasma confinement and to a certain extent also the discharge characteristics of the DM. A special effect can be observed in in the DM when the magnetrons are tilted; i.e. tilt angle is non zero. This phenomenon is called plasma drift in dual magnetron [2,3]. In this study we focus on the detailed investigation of the effect of magnetic field configuration on the performance of the DM, especially on the current-voltage characteristics, on the deposition rate and a special attention is devoted to the plasma drift effect. An optical emission spectrocopy was employed to analyse spatial distribution of the plasma discharge in order to bring new insight into properties of plasma drift effect. It is shown that the higher is the tilt angle of the magnetrons, the more pronounced is the plasma drift effect.

References

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