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Study of discharge characteristics on transition from metallic to reactive mode in radio frequency magnetron plasma JOYANTI CHUTIA, HEMEN KAKATI, ARUP RATAN PAL, HEREMBA BAILUNG, Institute of Advanced Study in Science and Technology — The technique of reactive magnetron sputtering with argon as buffer gas and oxygen as reactive gas is widely used for deposition of different types of metal-oxide films. In this work, the influence of oxygen flow rate on the discharge characteristics at fixed argon pressure and applied power in a radio frequency magnetron plasma using aluminum as target is investigated. The reactive sputtering of aluminum target in argon and oxygen environment is generally operated in two stable modes namely metallic and reactive mode. The variation of discharge voltage and self-bias with oxygen flow rate is measured with the help of a high voltage probe and the transition of the discharge from metallic to reactive mode is observed. The sheath structure determined from the potential profile measured by the emissive probe, is found to be affected by the oxygen flow rate. From the optical emission spectroscopic measurement, the line intensities for aluminum and aluminum oxide are measured for different flows of oxygen and are found to be highly affected by the transition of the discharge from metallic to reactive mode. From these investigations, optimum value of the oxygen flow rate at fixed power and argon pressure is determined for the formation of aluminum oxide.

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