

DC Glow Discharge Plasma Characteristics in Ar/O₂ Gas Mixture

In this article, the effects of the O₂ ratio on the electrical characteristics, including the I-V characteristic curve, Panchen's curve, and I-P curve, were tested in a sample of O₂/Ar gaseous mixture. The sample was produced by plasma-based DC magnetron sputtering with niobium metal as a target material. The inter-electrode spacing value was 4 cm. Plasma diagnosis via the Optical Emission Spectroscopy (OES) method was used to achieve Te and Ne mixture values of 20 %, 30 %, 50%, and 70% in the Ar/O₂ system. The results showed that the discharge is operating in the abnormal glow region and the discharge current was decreased by increasing O₂ percentage. In addition, the experimental results showed that the discharge is optimal at 30% gas ratio. It was found that the electron temperature was decreased with increasing working pressure and increased with increasing the O₂ percentage, while electron density was increased with increasing both working gas pressure and O₂ percentage.