PVD 증착용 흡착인히비터의 영향에 따른 제작막의 특성 비교

Characteristics Comparison of Prepared Films According to Influence of Adsorption Inhibitor in the Condition of Deposition

이찬식, 윤용섭, 권식철*, 김기준, 이명훈
(한국해양대학교, *한국기계연구원)

The structure zone model has been used to provide an overview of the relationship between the microstructure of the films deposited by PVD and the most prominent deposition conditions. B.A.Movchan and A.V.Demchishin have proposed it firstls such model. They concluded that the general features of the resulting structures could be correlated into three zones depending on T/T_m. Here T_m is the melting point of the coating material and T is the substrate temperature in kelvines. Zone 1 ($T/T_m<0.3$) is dominated by tapered macrograins with domed tops, zone 2 ($0.3<T/T_m<0.45$) by columnar grains with denser boundaries and zone 3 ($T/T_m>0.5$) by equiaxed grains formed by recrystallization. J.A.Thornton has extended this model to include the effect of the sputtering gas pressure and found a fourth zone termed zone T(transition zone) consisting of a dense array of poorly defined fibrous grains. R.Messier found that the zone I-T boundary (fourth zone of Thorton) varies in a fashion similar to the film bias potential as a function of gas pressure. However, there has not nearly enough model for explaining the change in morphology with crystal orientation of the films. The structure zone model only provide an information about the morphology of the deposited film. In general, the nucleation and growth mechanism for granular and fine structure of the deposited films are very complex in an PVD technique because the morphology and orientation depend not only on the substrate temperature but also on the energy of deposition of the atoms or ions, the kinetic mechanism between metal atoms and argon or nitrogen gas, and even on the presence of impurities.

In order to clarify these relationship, Al and Mg thin films were prepared on SPCC steel substrates by PVD techniques. The influence of gas pressures and bias voltages on their crystal orientation and morphology of the prepared films were investigated by SEM and XRD, respectively. And the effect of crystal orientation and morphology of the prepared films on corrosion resistance was estimated by measuring polarization curves in 3% NaCl solution.