HIPIMS Cr/CrN Multilayer Structure for Corrosion Resistant Decorative Coating

Yen-Chun Liu[a] , Shih-Nan Hsiao[a], Wen-Chi Lo[a], Ying-Hung Chen[a] Ju-Liang He[a]

[a]*Department of Materials Science and Engineering, Feng Chia University, No. 100, Wenhwa Rd., Seatwen District, Taichung City 40724, Taiwan.*

Abstract

Physical vapor deposition (PVD) processes have long been considered for decorative applications, as alternatives for electroplating processes. However, relatively little progress has been made due to corrosion issues brought by the existing defects in the coating structure resulting from the conventional PVD film morphology. By combining highly ionized PVD and multilayer structure, it is anticipated that corrosion protectiveness shall be improved further due to more effective barrier property to corrosive environment.

This study employs high power impulse magnetron sputtering (HIPIMS) to deposit Cr/CrN multilayer coatings on copper alloy substrates. The main advantages of HIPIMS are much denser, and smoother coatings compared to conventional PVD thin film deposition techniques. This paper briefly describes the corrosion resistance of the obtained HIPIMS Cr/CrN multilayer coatings characterized by electrochemical technique. Microstructures of these coatings are also examined to correlate their respective corrosion protective effectiveness.

Keywords: Cr/CrN multilayer; high power impulse magnetron sputtering; HIPIMS; corrosion resistance; electrochemical technique.