

ADHESION OF HIGH REFLECTANCE METALLIC THIN FILMS ON SAPPHIRE SUBSTRATE FOR  
LED DEVICES

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Abstract

In this study, the adhesion of high reflectance metallic thin films on sapphire substrate is investigated. Various coating thickness was deposited on sapphire substrate. Single layer coating including Ti, Cr, Al<sub>2</sub>O<sub>3</sub>, Ag and AuSn materials was deposited on sapphire substrate. Multi-layer coating structure such as sapphire/Ti/Ag/AuSn, sapphire/Cr/Ag/AuSn, and sapphire/Al<sub>2</sub>O<sub>3</sub>/Ag/AuSn were also applied in this study. Simple peeling and lap shear test were used to measure the adhesion strength of the coating. For single layer coating structure, it was found that the sapphire/Al<sub>2</sub>O<sub>3</sub> coating structure shows the best adhesion among those single layer coating structures. The adhesion strength was measured to be 74MPa. On the other hand, the sapphire/Ag coating structure shows the worst adhesion. The Ag coating layer can be easily peeled off after deposition. For the multi-layer coating structures, it was found that the sapphire/Cr/Ag/AuSn coating structure shows the best adhesion among those multi-layer coating structures. The adhesion strength was measured to be 101MPa. While, the sapphire/Al<sub>2</sub>O<sub>3</sub>/Ag/AuSn coating structures shows the worst adhesion. The adhesion strength was measured to be 1.8MPa.

Keyword : Coatings, reflectance, thin films, adhesion, adhesion strength