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Durability of doped zinc oxide/silver/doped zinc oxide low emissivity coatings in humid environment

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Abstract

The relationship between internal stress of doped zinc oxide films and durability of doped zinc oxide/silver/doped zinc oxide low emissivity (low-e) coatings in humid environment was investigated. Aluminum, titanium, tin, chromium, silicon, gallium, magnesium, boron, barium, and calcium were chosen as a doping element in sputtering targets. Ratios of dopant/zinc in the oxide targets were 4/96–5/95 at.%. Films were formed by radio frequency sputtering. Doping of barium and calcium to the zinc oxide film led to a large increase in the internal stress. Doping of the other elements resulted in decreasing the internal stress. It was concluded that durability of the low-e coatings in humid environment closely correlated with the internal stress of the oxide layers.

Keywords: Low emissivity; Silver; Zinc oxide; Coating; Sputtering; Internal stress; Durability