Short Communication

Post-annealed Aluminum-Doped Zinc Oxide/Tin-Doped Indium Oxide Bilayer Films for Low Emissivity Glass

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doi: 10.20964/2020.05.75

Received: 5 January 2020 / *Accepted:* 4 March 2020 / *Published:* 10 April 2020

This study uses post-annealed aluminum-doped zinc oxide /tin-doped indium oxide bilayer (AZO/ITO) films for low emissivity glass. The AZO/ITO films are deposited on glass substrates using in-line sputtering. The AZO/ITO films are subjected to either vacuum or hydrogen plasma annealing. The microstructure, the visible transmittance, the electrical properties and the emissivity of as-deposited, vacuum-annealed and plasma-annealed AZO/ITO films are measured. Hydrogen plasma annealing changes the surface morphology of AZO/ITO films. The average visible transmittance increases and the electrical resistivity and emissivity decrease for AZO/ITO films after vacuum or plasma annealing. The vertical cross-section and surface morphology for vacuum-annealed AZO/ITO films is similar to that for as-deposited films. The surface roughness of AZO/ITO films increases and polygonal grains form after plasma annealing. The electrical resistivity of the vacuum-annealed and hydrogen plasma-annealed AZO/ITO films is 59% and 63% less than the value for as-deposited films. The average visible transmittance of the vacuum-annealed and hydrogen plasma-annealed AZO/ITO films is 8.64% and 12.71% greater than the value for as-deposited films. The emissivity of vacuum-annealed and hydrogen plasma-annealed samples is 2.3 times and 2.56 times less than that of as-deposited AZO/ITO films. The emissivity and the average visible transmittance for vacuum-annealed and hydrogen plasma-annealed AZO/ITO films is 0.09 and 81.58% respectively, which is within the range for commercial low emissivity materials.

Keywords: AZO/ITO; vacuum annealing; hydrogen plasma annealing; low emissivity glass

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