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DEPOSITION OF TRANSPARENT CONDUCTIVE AZO FILMS ON MEDIUM-SIZED GLASS AND POLYMER SUBSTRATES

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AZO transparent conductive coatings are one of the alternatives to ITO-based coatings with the closest possible optical and electrical properties [1]. Importantly, they do not contain rare and toxic elements that makes the usage of AZO-based transparent conductive coatings advantageous. In this study, thin layers of AZO (up to 2 μm) were deposited on medium-sized substrates. The substrate materials were silicon glass, acrylic, and polycarbonate. The deposition was carried out using a Pinch Magneto series magnetron [2].

Coatings were deposited by sputtering a sintered ceramic target AZO (98% ZnO:2% Al_2O_3) in DC power mode. The magnetron used for deposition was unbalanced, that resulted in significant flux of ions falling on the substrate. In order to mitigate the ion flux, the deposition was carried out at a sufficiently high pressure of 1 Torr. It has been experimentally shown that this pressure is optimal and makes it possible to achieve AZO films with electrical resistivity of ~ 4×10^{-6} Ω×m, while maintaining transparency in the optical range of 76%. The obtained mass spectra showed a correlation between the decrease in the ion flux and an increase in pressure.

Due to the design features of the sample table, the substrate is practically thermally insulated in vacuum. For acrylic samples, this leads to cracking of the coatings when the energy load exceeds 150 W×h. For polycarbonate samples, it was possible to achieve good resistivity and optical transparency (~ 6×10^{-6} Ω×m; 76% transparency) at an energy load of less than 300 W×h.

REFERENCES

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