

Transparent Flexible Plastic Substrates for Organic Light-Emitting Devices

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Abstract

We describe the properties of flexible plastic substrates with a transparent conducting electrode (TCE), which are important for organic light-emitting devices (OLEDs). Specifically, we have evaluated the TCE electrical resistivity, surface roughness, electrode patterning, optical transmission, and the substrate water vapor/oxygen transmission. We have studied the effect of ultraviolet (UV)-ozone treatment on the TCE surface by using contact angle measurements and x-ray photoelectron spectroscopy (XPS). A decrease in the advancing contact angle and an increase of oxygen content on the TCE surface were observed after the UV-ozone treatment. These changes facilitate the polymer adhesion to the TCE surface and increase the TCE surface work function, respectively. An increased optical transmission greater than 80% over the visible range, and a surface roughness of 1.0-2.4-nm RMS over $50 \times 50 \mu\text{m}^2$ have been obtained for the plastic substrates. These properties are adequate for OLED applications.