PW-P013

The Effect of Thickness on Flexible, Electrical and Optical properties of Ti- ZnO films on Flexible Glass by Atomic Layer Deposition

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TCO(Transparent Conducting Oxide) on flat glass is used in thin-film photovoltaic cell, flat-panel display. Nowadays, Corning® Willow Glass®, known as flexible substrate, has attracted much attention due to its many advantages such as reliable roll-to-roll glass processing, high-quality flexible electronic devices, high temperature process. Also, it can be an alternative to flexible polymer substrates which have their poor stability and degradation of electrical and optical qualities. For application on willow glass, the flexibility, electrical, optical properties can be greatly influenced by the TCO thin film thickness due to the inherent characterization of thin film in nanoscale. It can be expected that while thick TCO layer causes poor transparency, its sheet resistance become low. Also, rarely reports were focusing on the influence of flexible properties by varying TCO thickness on flexible glass. Therefore, it is very important to optimize TCO thickness on flexible Willow glass.

In this study, Ti-ZnO thin films, with different thickness varied from 0 nm to 50 nm, were deposited on the flexible willow glass by atomic layer deposition (ALD). The flexible, electrical and optical properties were investigated, respectively. Also, these properties of Ti-doped ZnO thin films were compared with un-doped ZnO thin film. Based on the results, when Ti-ZnO thin films thickness increased, resistivity decreased and then saturated; transmittance decreased. The Figure of Merit (FoM) and flexibility was the highest when Ti-ZnO thickness was 40nm. The flexible, electrical and optical properties of Ti-ZnO thin films were better than ZnO thin film at the same thickness.

Keywords: atomic layer deposition, Ti-ZnO, Flexible glass

PW-P014

Understanding Switching Arcs and Dielectric Capability of a SF6 Self-Blast Interrupter

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The design and development procedures of SF6 gas circuit breakers are still largely based on trial and error through testing although the development costs go higher every year. The computation cannot cover the testing satisfactorily because all the real processes arc not taken into account. But the knowledge of the arc behavior and the prediction of thermal plasmas inside SF6 interrupters by numerical simulations are more useful than those by experiments due to the difficulties to obtain physical quantities experimentally and the reduction of computational costs in recent years. In this paper, in order to get further information into the interruption process of a SF6 self-blast interrupter, which is based on the combination of thermal expansion and arc rotation, gas flow simulations with a CFD-arc modeling are performed during the whole switching process such as high-current period, pre-current zero period, and current-zero period. Through the complete work, the temperature of residual arcs as well as the breakdown index after current zero should be a good criterion to predict the dielectric capability of interrupters.

Keywords: Switching arc, Thermal plasmas, SF6 self-blast interrupter, Dielectric capability, Computational fluid dynamics