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Optimization of Amorphous Indium Gallium Zinc Oxide Thin Film for Transparent Thin Film Transistor Applications

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Indium Tin Oxide (ITO) films are the most extensively studied and commonly used as ones of TCO films. The ITO films having a high electric conductivity and high transparency are easily fabricated on glass substrate at a substrate temperature over 250°C. However, glass substrates are somewhat heavy and brittle, whereas plastic substrates are lightweight, unbreakable, and so on. For these reasons, it has been recently suggested to use plastic substrates for flexible display application instead of glass. Many reaearchers have tried to produce high quality thin films at rood temperatures by using several methods. Therefore, amorphous ITO films excluding thermal process exhibit a decrease in electrical conductivity and optical transparency with time and a very poor chemical stability. However the amorphous Indium Gallium Zinc Oxide (IGZO) offers several advantages. For typical instance, unlike either crystalline or amorphous ITO, same and higher than a-IGZO resistivity is found when no reactive oxygen is added to the sputter chamber, this greatly simplifies the deposition. We reported on the characteristics of a-IGZO thin films were fabricated by RF-magnetron sputtering method on the PEN substrate at room temperature using 3inch sputtering targets different rate of Zn. The homogeneous and stable targets were prepared by calcine and sintering process. Furthermore, two types of IGZO TFT design, a- IGZO source/drain material in TFT and the other a- ITO source/drain material, have been fabricated for comparison with each other. The experimental results reveal that the a- IGZO source/drain electrode in IGZO TFT is shown to be superior TFT performances, compared with a- ITO source/drain electrode in IGZO TFT.

Keywords: IGZO, TCO, TFT

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The Characterization of Mn Based Self-forming Barriers on low-k Samples with or without UV Curing Treatment

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In this present work, we report a Cu-Mn alloy as a materials for the self-forming barrier process. And we investigated diffusion barrier properties of self-formed layer on low-k dielectrics with or without UV curing treatment. Cu alloy films were directly deposited onto low-k dielectrics by co-sputtering, followed by annealing at various temperatures. X-ray diffraction revealed Cu (111), Cu (200) and Cu (220) peaks for both of Cu alloys. The self-formed layers were investigated by transmission electron microscopy. In order to compare barrier properties between Mn-based interlayer interlayer, thermal stability was measured with various low-k dielectrics. X-ray photoelectron spectroscopy analysis showed that chemical compositions of self-formed layer. The compositions of the Mn based self-formed barriers after annealing were determined by the C concentration in the dielectric layers.

Keywords: Copper interconnect, Self-forming barrier, Manganese