TT-P030

Solution-based Multistacked Active Layer IGZO TFTs

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In this study, we prepared the solution-based In-Ga-Zn oxide thin film transistors (IGZO TFTs) of multistacked active layer and characterized the gate bias instability by measuring the change in threshold voltage caused by stacking. The solutions for IGZO active layer were prepared by In:Zn=1:1 mole ratio and the ratio of Ga was changed from 20% to 30%. The TFTs with multistacked active layer was fabricated by stacking single, double and triple layers from the prepared solutions. As the number of active layer increases, the saturation mobility shows the value of 1.2, 0.8 and 0.6 (). The electrical properties have the tendency such as decreasing. However when gate bias VG=10 V is forced to gate electrode for 3000 s, the threshold voltage shift was decreased from 4.74 V to 1.27 V. Because the interface is formed between the each layers and this affected the current path to reduce the electrical performances. But the uniformity of active layer was improved by stacking active layer with filling the hole formed during pre-baking so the stability of device was improved. These results suggest that the deposition of multistacked active layer improve the stability of the device.

Keywords: Solution, IGZO, TFT, Multistack, instbility

TT-P031

Work Function Modification of Indium Tin Oxide Thin Films Sputtered on Silicon Substrate

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Indium tin oxide (ITO) has a lot of variations of its properties because it is basically in an amorphous state. Therefore, the differences in composition ratio of ITO can result in alteration of electrical properties. Normally, ITO is considered as transparent conductive oxide (TCO), possessing excellent properties for the optical and electrical devices. Quantitatively, TCO has transparency over 80 percent within the range of 380nm to 780nm, which is visible light although its specific resistance is less than 10-3 Ω/cm. Thus, the solar cell is the best example for which ITO has perfectly matching profile. In addition, when ITO is used as transparent conductive electrode, this material essentially has to have a proper work function with contact materials. For instance, heterojunction with intrinsic thin layer (HIT) solar cell could have both front ITO and backside ITO. Because each side of ITO films has different type of contact materials, p-type amorphous silicon and n-type amorphous silicon, work function of ITO has to be modified to transport carrier with low built-in potential and Schottky barrier, and approximately requires variation from 3 eV to 5 eV. In this study, we examine the change of work function for different sputtering conditions using ultraviolet photoelectron spectroscopy (UPS). Structure of ITO films was investigated by spectroscopic ellipsometry (SE) and scanning electron microscopy (SEM). Optical transmittance of the films was evaluated by using an ultraviolet-visible (UV-Vis) spectrophotometer

Keywords: work function, ITO, UPS