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Effect of substrate temperature and flow rate of hydrogen gases on the characteristics of MZO and IGZO thin films

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Transparent Conductive Oxides (TCOs) thin films are used for electrodes in lighting devices like displays, solar cells, etc. TCOs have to show the low electrical resistances and the good light transmittances at the same time. ITO (Indium Tin Oxide, Sn-doped In_2O_3) of TCO materials has the above two properties and are most commercially used as TCOs. However, ITO has some problems. The cost of Indium of main ingredient of ITO is expensive and the supplies are unstable. Not only deposition temperature should be higher than at less 250°C but also heat treatment is needed after the deposition. These high temperature processes are main factors of the poor roughness of thin films and undesirable effects to the device stability. Because of these problems, we are interested in TCO materials to substitute ITO. Among TCO materials, ZnO based TCO materials are chemically stable and can be deposited at room temperature and has the low electrical resistance and the high light transmittance. In this study, we used two targets, MZO (Mo 2 wt%) and IGZO (In 1 mol%, Ga 1 mol%) by RF magnetron sputter. To observe the characteristics depending on atmospheric gas and substrate temperature, we flowed ambient gas ($\text{Ar}+\text{H}_2$) from 0sccm to 4sccm and changed the substrate temperature from RT to 300°C . To observe microstructures of thin films, we used XRD and SEM and to indicate the electrical properties of thin films, we used Hall measurement system.

Biography

Ji Hoon Jeong is currently pursuing his Master's degree from Korea University of Technology and Education, Republic of Korea.

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