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# Device characteristics of Schottky barrier diodes using In-Ga-Zn-O semiconductor thin films with different atomic ratios

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**ABSTRACT**

Oxide semiconductor Schottky barrier diodes (SBDs) were fabricated by using amorphous In-Ga-Zn-O (IGZO) semiconducting thin films with different atomic ratios. Higher rectification ratios and Schottky barrier heights (SBHs) were obtained when the oxygen partial pressure was high during the sputtering deposition of the IGZO films. The increase in Ga composition effectively enhanced the device characteristics, including the rectification ratio and the SBH of the SBDs. These properties were closely related to the control of oxygen vacancy concentration within the IGZO and the resulting conduction behaviors owing to Fermi-level pinning and tunneling current through the Schottky barrier. The fabricated SBD using IGZO with a higher Ga composition (In:Ga:Zn=1.0:0.8:0.3) exhibited a rectification ratio of $8.3\times10^6$ and an SBH of 0.79 eV.

Keywords: Oxide semiconductor, Schottky junction, Schottky barrier diode, In-Ga-Zn-

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