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# High-performance transparent Li-doped indium-tin-zinc-oxide thin film transistor fabricated by radio frequency magnetron sputtering method

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## Abstract

In this work, a Li-doped indium-tin-zinc-oxide (ITZO:Li) thin film transistor was investigated. The ITZO:Li active channel layer was deposited on an SiO<sub>2</sub>/Si substrate by radio frequency magnetron sputtering at room temperature. The micro structure of the active channel layer is amorphous, as confirmed by X-ray diffraction patterns. The transmittance of the films is above 80% for the visible region (400 nm-700 nm), which indicates excellent optical transparency. The band gap energy of films annealed at 325 °C is about 3.71 eV from the absorption spectrum. It was demonstrated that TFTs fabricated using Li-doped ITZO have fewer oxygen vacancies and enhanced mobility compared to that of undoped ITZO TFTs. The obtained TFTs operate in enhancement mode with a threshold voltage of 0.4 V, a saturation mobility of 39.1 cm<sup>2</sup>V<sup>-1</sup>s<sup>-1</sup>, and an on/off current ratio of 8.0×10<sup>6</sup>.

Key-words: amorphous materials, Li-doped indium zinc tin oxide, thin film, thin film transistor,

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