

# Alternating Current Thin Film Electroluminescence from Amorphous Gallium Oxide Doped with Manganese

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Alternating current thin film electroluminescence (ACTFEL) characteristics of amorphous gallium oxide doped with manganese (a-Ga<sub>2</sub>O<sub>3</sub>:Mn) have been investigated. The a-Ga<sub>2</sub>O<sub>3</sub>:Mn thin films were prepared at room temperature by radio frequency (RF) planar magnetron sputtering from a 2 mol% Mn-doped Ga<sub>2</sub>O<sub>3</sub> target in an oxygen-argon mixture atmosphere. The structure and properties of the deposited a-Ga<sub>2</sub>O<sub>3</sub>:Mn films were characterized by x-ray diffraction (XRD), field emission scanning electron microscopy (FESEM), atomic force microscopy (AFM), energy dispersive x-ray analysis (EDX), and Auger electron spectroscopy (AES). The devices for ACTFEL studies were constructed on alumina (Al<sub>2</sub>O<sub>3</sub>) substrates using an inverted single-insulating structure, which consists of indium tin oxide (ITO), a-Ga<sub>2</sub>O<sub>3</sub>:Mn, lead zirconate titanate (PZT), and Au. The fabricated ACTFEL devices exhibited a broad band EL emission peaked at around 507 nm in green range, which is accounted for by the 3d-3d intrashell transition from the <sup>4</sup>T<sub>1</sub> excited state level to the <sup>6</sup>A<sub>1</sub> ground state in divalent manganese ion. The color coordinates of the EL emission were x=0.197 and y=0.623 in the CIE chromaticity.