

## Preparation and characterization of p-type transparent conducting CuAlO<sub>2</sub> thin films.

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N-type conducting transparent oxide (TCO) films, such as In<sub>2-x</sub>Sn<sub>x</sub>O<sub>3</sub> (ITOs) and ZnO<sub>1-x</sub> have been widely employed as transparent electrodes in flat-panel displays, photovoltaic cells, optoelectronic devices, and energy-efficient coatings. Recently, p-type TCO's have been demanded in electronic industry; this is mainly because a combination of two different types of TCOs in the form of p-n junction can be employed for the application of wide-band gap photodetecting electronic devices. We prepared p-type transparent conducting oxide CuAlO<sub>2</sub> thin films by RF magnetron sputtering and measured their physical and optical properties in terms of preparation conditions.

A 2 " CuAlO<sub>2</sub> target was prepared by sintering a green body made of the calcined powders at 1250°C for 6 hours in air and then furnace cooled. CuAlO<sub>2</sub> thin films were deposited on Si (100) and glass substrates; the substrate temperature ranged from room temperature to 300°C. The maximum grain size of the films was approximately 57.0 nm; this was obtained when the films were prepared at 200°C. The conductivity of CuAlO<sub>2</sub> thin films was 3.55 S/cm when they were prepared at 100°C. X-ray diffraction spectrums were used to analyze structural features of the films. Variation in the electrical and optical properties of the films with the structural features will be discussed in detail in terms of deposition conditions.