

STRUKTUR DAN KOMPOSISI KIMIA BAHAN SEMIKONDUKTOR Sn(Se_{0,2}S_{0,8}) LAPISAN TIPIS HASIL PREPARASI TEKNIK VAKUM EVAPORASI UNTUK APLIKASI SEL SURYA

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ABSTRAK

Penelitian ini bertujuan untuk menumbuhkan lapisan tipis Sn(Se_{0,2}S_{0,8}) dengan metode evaporasi. Peneliti dapat mengetahui pengaruh variasi *spacer* terhadap struktur, parameter kristal, morfologi permukaan, dan komposisi kimia lapisan tipis Sn(Se_{0,2}S_{0,8}).

Proses preparasi lapisan tipis Sn(Se_{0,2}S_{0,8}) dilakukan dengan menggunakan metode evaporasi yang bekerja pada tekanan sekitar 2×10^{-5} mbar. Proses pendeposisian lapisan tipis Sn(Se_{0,2}S_{0,8}) dilakukan dengan memberikan *spacer* antara substrat dengan sumber yaitu 25 cm, 15 cm, dan 10 cm. Proses karakterisasi dilakukan menggunakan *X-Ray Diffraction* (XRD) untuk menentukan struktur dan parameter kisi lapisan tipis, *Scanning Electron Microscopy* (SEM) untuk menentukan morfologi permukaan lapisan tipis dan *Energy Dispersive Analysis X-Ray* (EDAX) untuk menentukan komposisi lapisan tipis.

Hasil karakterisasi XRD menunjukkan bahwa lapisan tipis Sn(Se_{0,2}S_{0,8}) merupakan polikristal dan memiliki struktur kristal *orthorombik*, dengan nilai parameter kisi sampel 1 (*spacer* 25 cm): $a = 4,306 \text{ \AA}$, $b = 11,30 \text{ \AA}$, $c = 4,139 \text{ \AA}$; sampel 2 (*spacer* 15 cm): $a = 4,286 \text{ \AA}$, $b = 11,18 \text{ \AA}$, $c = 4,123 \text{ \AA}$; sampel 3 (*spacer* 10 cm): $a = 4,301 \text{ \AA}$, $b = 11,30 \text{ \AA}$, $c = 4,143 \text{ \AA}$. Hasil karakterisasi SEM pada Sn(Se_{0,2}S_{0,8}) sampel 2 menunjukkan bahwa morfologi permukaan sampel terdiri atas butiran/grain berbentuk keping lonjong, dengan ukuran diameter butiran pada permukaan kristal sekitar $0,3 \text{ \mu m}$ - $0,5 \text{ \mu m}$ dan homogen. Hasil analisis EDAX, kristal Sn(Se_{0,2}S_{0,8}) menunjukkan perbandingan persentase komposisi kimia lapisan tipis yaitu 1 : 0,11 : 0,79.

Kata kunci: metode evaporasi, semikonduktor Sn(Se_{0,2}S_{0,8}), sel surya, karakteristik bahan.

**STRUCTURE AND CHEMICAL COMPOSITION OF SEMICONDUCTOR
MATERIAL Sn(Se_{0.2}S_{0.8}) THIN FILM PREPARATION OF USING
EVAPORATION METHOD TO SOLAR CELL APPLIED**

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ABSTRACT

This research aims to grow a thin film Sn(Se_{0.2}S_{0.8}) by evaporation method. Researcher can understand the effect of variation spacers to the crystal structure, lattice parameter, surface morphology, and chemical composition of thin film Sn(Se_{0.2}S_{0.8}).

The process of thin film Sn(Se_{0.2}S_{0.8}) preparation was performed by using the evaporation method on the pressure about 2×10^{-5} mbar. The process of thin film Sn(Se_{0.2}S_{0.8}) deposition was performed by giving spacer between the substrate and the source i.e 25 cm, 15 cm, and 10 cm. Characterization process was performed by using X-ray Diffraction (XRD) to determine the structure and parameter of thin film, Scanning Electron Microscopy (SEM) to determine the thin film of surface morphology and Energy Dispersive Analysis X-Ray (EDAX) to determine the chemical composition of the thin film.

The result of XRD characterization show that the thin film Sn(Se_{0.2}S_{0.8}) was polycrystalline and it has the orthorombic crystal structure, with the lattice parameter were sample 1 (spacer 25 cm): $a = 4.306 \text{ \AA}$, $b = 11.30 \text{ \AA}$, $c = 4.139 \text{ \AA}$; sample 2 (spacer 15 cm): $a = 4.286 \text{ \AA}$, $b = 11.18 \text{ \AA}$, $c = 4.123 \text{ \AA}$; sample 3 (spacer 10 cm): $a = 4.301 \text{ \AA}$, $b = 11.30 \text{ \AA}$, $c = 4.143 \text{ \AA}$. The result of SEM characterization in the sample 2 of Sn(Se_{0.2}S_{0.8}) showed that the surface morpholgy of sample consisted of homogeneous oval shaped grains, with the diameter size of crystal grains on the surface about $0.3 \text{ \mu m} - 0.5 \text{ \mu m}$. The result of EDAX analysis showed that comparison of percentage of chemical composition thin film Sn(Se_{0.2}S_{0.8}) that is 1: 0.11 : 0.79.

Keywords: evaporation method, semiconductor Sn(Se_{0.2}S_{0.8}), sollar cell, material characteristics