

**PENGARUH KETEBALAN LAPISAN TIPIS ZnO TERHADAP KINERJA
SEL SURYA PEROVSKIT FLEKSIBEL**

SKRIPSI

diajukan untuk memenuhi salah satu syarat untuk memperoleh gelar Sarjana Sains

Program Studi Fisika

Konsentrasi Fisika Material



oleh

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1900068

**PROGRAM STUDI FISIKA
FAKULTAS PENDIDIKAN MATEMATIKA DAN ILMU PENGETAHUAN ALAM
UNIVERSITAS PENDIDIKAN INDONESIA**

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PERNYATAAN

Dengan ini saya menyatakan bahwa skripsi dengan judul “**PENGARUH KETEBALAN LAPISAN TIPIS ZnO TERHADAP KINERJA SEL SURYA PEROVSKIT FLEKSIBEL**” ini beserta seluruh isinya adalah benar-benar karya saya sendiri. Saya tidak melakukan penjiplakan atau pengutipan dengan cara-cara yang tidak sesuai dengan etika ilmu yang berlaku dalam masyarakat keilmuan. Atas pernyataan ini, saya siap menanggung risiko/sanksi apabila di kemudian hari ditemukan adanya pelanggaran etika keilmuan atau ada klaim dari pihak lain terhadap keaslian karya saya ini.

Bandung, 23 Juli 2023

Yang membuat pernyataan



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KATA PENGANTAR

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Dalam penyusunan skripsi ini begitu banyak hambatan dan tantangan yang dihadapi penulis. Namun, berkat kerja keras dan kesabaran yang diiringi do’a serta bimbingan, arahan, dan dukungan dari berbagai pihak baik secara langsung maupun tidak langsung, penulis dapat menyelesaikan pengerjaan skripsi ini.

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Penulis

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ABSTRAK

PENGARUH KETEBALAN LAPISAN TIPIS ZnO TERHADAP KINERJA SEL SURYA PEROVSKIT FLEKSIBEL

Oleh

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(Program Studi Fisika)

Perovskite Solar Cells (PSC) merupakan sel fotovoltaik generasi ketiga yang telah diakui sebagai salah satu fotovoltaik yang prospektif, karena koefisien penyerapan tinggi dan pengangkutan muatan yang sangat baik. Ketebalan lapisan fotoelektroda merupakan parameter penting yang memengaruhi performansi PSC. Banyak penelitian PSC dilakukan dengan lapisan fotoelektroda berbeda untuk meningkatkan kinerja sel surya. Oleh karena itu, penelitian ini berfokus pada pengaruh ketebalan lapisan fotoelektroda ZnO terhadap sifat optik dan kinerja PSC. Karakterisasi spektrofotometer Uv-Vis menghasilkan sifat optik berupa data spektrum absorbansi dan transmitansi yang kemudian diolah menghasilkan data energi celah pita. Transmitansi rata-rata yang dihasilkan diatas 50%, energi celah pita dari ketebalan fotoelektroda yang berbeda juga dihitung dari data spektrum absorbansi, hasilnya setiap sampel memiliki nilai yang tidak berbeda signifikan yaitu pada rentang 3,12-3,20 eV. Sedangkan untuk kinerja sel surya, karakterisasi dilakukan dengan *standard solar simulator 1,5 AM filter 100 mW/cm²* menghasilkan kelistirikan sel yang meliputi densitas arus *short-circuit* (J_{sc}), tegangan *open-circuit* (V_{oc}), *Fill Factor* (FF) serta efisiensi sel. Tren efisiensi pada penelitian saat ini yaitu efisiensi meningkat ketika ketebalan fotoelektroda menurun. Hasil yang diperoleh pada penelitian ini sesuai dengan tren tersebut, sampel dengan ketebalan 4 μm memiliki efisiensi terbaik $4,310 \times 10^{-5} \%$ dengan J_{sc} 0,004 mA/cm², V_{oc} 0,066 V dan FF 24,157%.

Kata Kunci : Ketebalan fotoelektroda, Sel surya perovskit, ZnO

ABSTRACT

THE EFFECT OF ZnO THICKNESS ON FLEXIBLE PEROVSKITE SOLAR CELL PERFORMANCE

by

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(Physics Study Program)

Perovskite Solar Cells (PSC) are the third generation of photovoltaic cells which have been recognized as one of the prospective photovoltaics, due to their high absorption coefficient and excellent charge transport. The thickness of the photoelectrode layer is an important parameter that affects PSC performance. Many PSC studies have been carried out with different photoelectrode layer to improve solar cell performance. Therefore, this research focuses on the effect of ZnO photoelectrode layer thickness on the optical properties and performance of perovskite solar cells. Uv-Vis spectrophotometer characterization produces optical properties in the form of absorbance and transmittance spectrum data which is then processed to produced bandgap energy. The resulting average transmittance is above 50%, the band gap energy of different photoelectrode thicknesses is also calculated from the absorbance spectrum data, and the results for each sample have values that are not significantly different, namely in the range of 3.12-3.20 eV. As for the performance of solar cells, the characterization is carried out with a standard solar simulator 1.5 AM filter 100 mW/cm² to produce cell electricity which includes short-circuit current density (J_{sc}), open-circuit voltage (V_{oc}), Fill Factor (FF) and efficiency cell. The efficiency trend in current research is that efficiency increases when the thickness of the photoelectrode decreases. The results obtained in this study are in accordance with this trend, namely samples with a thickness of 4 μm have the best efficiency of $4.310 \times 10^{-5}\%$ with J_{sc} 0.004 mA/cm², V_{oc} 0.066 V, and FF 24.157%.

Keyword: *Photoelectrode thickness, Perovskite solar cells, ZnO*

DAFTAR ISI

LEMBAR PENGESAHAN	ii
PERNYATAAN.....	iii
KATA PENGANTAR	iv
UCAPAN TERIMA KASIH.....	v
ABSTRAK	vii
<i>ABSTRACT</i>	viii
DAFTAR ISI.....	ix
DAFTAR TABEL.....	xi
DAFTAR GAMBAR	xii
BAB I PENDAHULUAN.....	1
1.1 Latar Belakang.....	1
1.2 Rumusan Masalah.....	4
1.3 Batasan Masalah	4
1.4 Tujuan Penelitian	4
1.5 Manfaat Penelitian	4
1.6 Sistematika Penyusunan Laporan	5
BAB II TINJAUAN PUSTAKA.....	6
2.1 Sel Surya.....	6
2.2 <i>Perovskite Solar Cell</i> (PSC)	7
2.3 Komponen PSC.....	9
2.3.1 Substrat.....	10
2.3.2 Fotoelektroda.....	12
2.3.3 Sensitizer	13
2.3.4 Elektrolit.....	14
2.3.5 Elektroda Balik.....	14
2.4 Sintesis PSC.....	15
2.5 Prinsip Kerja PSC	16
2.6 Penggunaan PSC Saat Ini di Dunia Nyata	17

2.7	Kinerja PSC dengan Ketebalan Lapisan Semikonduktor yang Berbeda ..	18
2.8	Karakterisasi PSC	19
BAB III METODE PENELITIAN.....		21
3.1	Waktu dan Tempat Penelitian.....	21
3.2	Metode Penelitian	21
3.3	Alat dan Bahan yang Digunakan	22
3.4	Prosedur Penelitian	24
3.4.1	Preparasi Pembuatan Fotoelektroda ZnO.....	24
a.	Pembuatan Larutan ZnO	24
b.	Film Tipis ZnO	25
c.	Pemanasan Film Tipis ZnO	26
d.	Karakterisasi Spektrofotometri UV-Vis	26
e.	Analisis Sifat Optik Lapisan Tipis ZnO	27
3.4.2	Preparasi Pembuatan Sel Surya.....	28
a.	Preparasi Pembuatan Lapisan Sensitizer Perovskit $\text{CH}_3\text{NH}_3\text{PbI}_3$	28
b.	Preparasi Pembuatan Lapisan Elektrolit Spiro-OMeTAD.....	29
c.	Preparasi Pembuatan Lapisan Elektroda Balik rGO	30
d.	Karakterisasi <i>Standard Solar Simulator 1,5 AM Filter 100 W/m/cm²</i>	31
e.	Analisis Kinerja Sel Surya.....	31
BAB IV HASIL DAN PEMBAHASAN		33
4.1	Sintesis Fotoelektroda ZnO	33
4.1.1	Ketebalan Fotoelektroda ZnO	33
4.1.2	Analisis Absorbansi dan Transmittansi Fotoelektroda ZnO	35
4.2	Analisis Efisiensi Sel Surya.....	39
BAB V SIMPULAN, IMPLIKASI DAN REKOMENDASI		43
5.1	Kesimpulan	43
5.2	Implikasi	43
5.3	Rekomendasi.....	43
DAFTAR PUSTAKA		44

DAFTAR TABEL

Tabel 2.1 Karakteristik Substrat PET.....	10
Tabel 2.2 PSC dengan Ketebalan yang Berbeda Berdasarkan Penelitian Sebelumnya.....	18
Tabel 3.1 Variabel Eksperimen.....	22
Tabel 3.2 Alat yang Digunakan dalam Penelitian.....	23
Tabel 3.3 Bahan yang Digunakan dalam Penelitian	23
Tabel 4.1 Ketebalan Lapisan ZnO	33
Tabel 4.2 Transmittansi Rata-Rata Lapisan ZnO dengan Variasi Ketebalan	36
Tabel 4.3 Nilai <i>Bandgap</i>	38
Tabel 4.4 Kinerja PSC.....	40

DAFTAR GAMBAR

Gambar 2.1 Struktur Kristal Logam Organik-Anorganik Halida Perovskit (Snaith, 2013)	8
Gambar 2.2 Struktur Diagram PSC.....	10
Gambar 2.3 Substrat Fleksibel PET	11
Gambar 2.4 Struktur Kristal Wurtzite ZnO (Samadi dkk., 2016).....	12
Gambar 2.5 Struktur Kristal CH ₃ NH ₃ PbI ₃ dalam Fase Yang Berbeda. (a) Fase Kubik, (b) Fase Tetragonal, (c) Fase Ortorombik (Green dkk., 2014)	13
Gambar 2.6 Struktur Kristal Spiro-OMeTAD (Nhari dkk., 2021).....	14
Gambar 2.7 Struktur Kristal rGO (Gómez-Navarro dkk., 2010)	15
Gambar 2.8 Prinsip Kerja Sel Surya Perovskit	16
Gambar 2.9 Karakteristik I-V Sel Surya (Tirado & Sumicol, 2020)	19
Gambar 3.1 Langkah-Langkah Penelitian.....	22
Gambar 3.2 Bahan dan Proses Pembuatan Larutan ZnO.....	24
Gambar 3.3 Pembersihan Substrat PET	25
Gambar 3.4 Proses deposisi fotoelektroda ZnO ke atas substrat ITO PET	25
Gambar 3.5 Pemanasan Film Tipis ZnO.....	26
Gambar 3.6 Spektrofotometri Uv-Vis	27
Gambar 3.7 Contoh <i>Tauc Plot</i> dari Analisis Uv-Vis Film Tipis ZnO (Wang dkk., 2008)	28
Gambar 3.8 Proses Pembuatan Perovskit CH ₃ NH ₃ PbI ₃	29
Gambar 3.9 Proses Pembuatan Spiro-OMeTAD	29
Gambar 3.10 Proses Pembuatan rGO.....	30
Gambar 3.11 Proses Pengeringan Sel Surya	30
Gambar 3.12 <i>Standard Solar Simulator 1,5 AM Filter 100 mWcm⁻²</i>	31
Gambar 3.13 Karakterisasi Sel Surya berupa Kurva J-V	32
Gambar 4.1 Sel Surya dengan Variasi Ketebalan (a) 10 µm (b) 8 µm (c) 6 µm (d) 4 µm.....	33
Gambar 4.2 Pengaruh Kecepatan <i>Spin Coating</i> terhadap Ketebalan Lapisan ZnO....	34
Gambar 4.3 Spektrum (a) Absorbansi dan (b) Transmittansi Larutan ZnO.....	35
Gambar 4.4 Spektrum (a) Absorbansi dan (b) Transmittansi Film Tipis ZnO dengan Ketebalan Yang Berbeda	36

Gambar 4.5 <i>Tauc Plot</i> Film Tipis ZnO dengan Ketebalan Berbeda (a) 10 μm (b) 8 μm (c) 6 μm (d) 4 μm	37
Gambar 4.6 Spektrum Absorbansi dan Transmittansi Perovskit $\text{CH}_3\text{NH}_3\text{PbI}_3$	38
Gambar 4.7 <i>Bandgap</i> Larutan Perovskit $\text{CH}_3\text{NH}_3\text{PbI}_3$	39
Gambar 4.8 Kurva Karakteristik J-V	39
Gambar 4.9 <i>Bandgap Diagram</i> ITO/ZnO/ $\text{CH}_3\text{NH}_3\text{PbI}_3$ /spiro-OMeTAD/rGO.....	40
Gambar 4.10 <i>Trendline</i> Grafik Korelasi Ketebalan Lapisan ZnO dengan (a) Transmittansi dan (b) <i>Bandgap</i> (c) Efisiensi	42

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