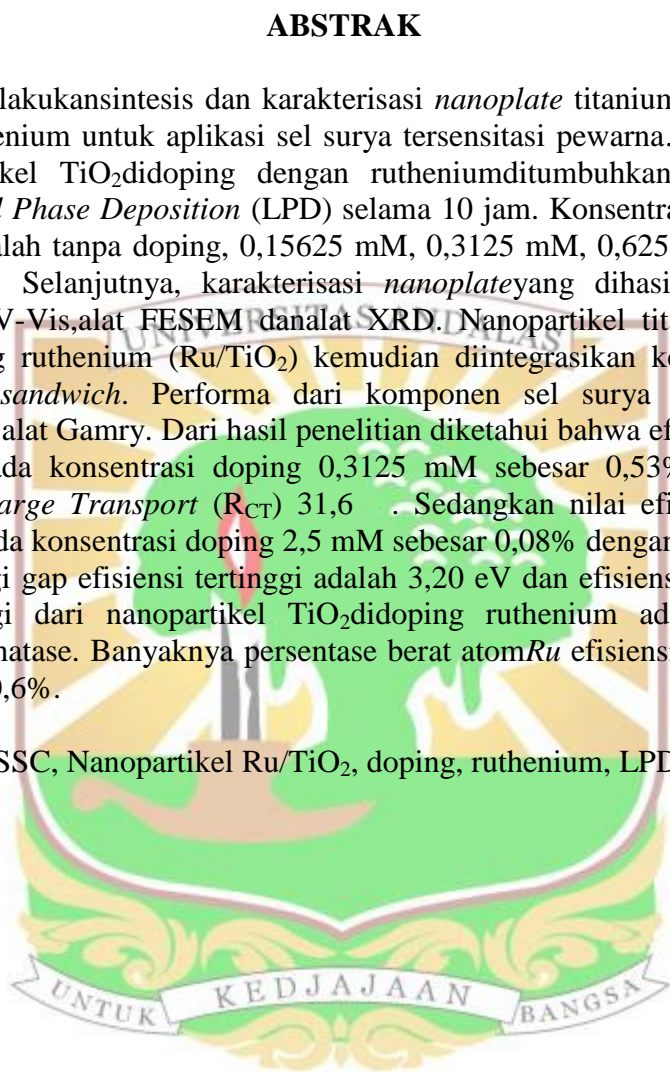


# SINTESIS DAN KARAKTERISASI *NANOPLATE* TITANIUM DIOKSIDA YANG DIDOPING RUTHENIUM UNTUK APLIKASI SEL SURYA TERSENSITASI PEWARNA

## ABSTRAK

Telah dilakukan sintesis dan karakterisasi *nanoplate* titanium dioksida yang didoping ruthenium untuk aplikasi sel surya tersensitasi pewarna. Pada penelitian ini, nanopartikel  $\text{TiO}_2$  didoping dengan ruthenium ditumbuhkan menggunakan metoda *Liquid Phase Deposition* (LPD) selama 10 jam. Konsentrasi doping yang digunakan adalah tanpa doping, 0,15625 mM, 0,3125 mM, 0,625 mM, 1,25 mM dan 2,5 mM. Selanjutnya, karakterisasi *nanoplate* yang dihasilkan dilakukan dengan alat UV-Vis, alat FESEM dan alat XRD. Nanopartikel titanium dioksida yang didoping ruthenium ( $\text{Ru/TiO}_2$ ) kemudian diintegrasikan ke dalam *device* dengan tipe *sandwich*. Performa dari komponen sel surya diukur dengan menggunakan alat Gamry. Dari hasil penelitian diketahui bahwa efisiensi tertinggi didapatkan pada konsentrasi doping 0,3125 mM sebesar 0,53% dengan nilai Resistansi *Charge Transport* ( $R_{CT}$ ) 31,6  $\Omega$ . Sedangkan nilai efisiensi terendah didapatkan pada konsentrasi doping 2,5 mM sebesar 0,08% dengan nilai  $R_{CT}$  45,38  $\Omega$ . Nilai energi gap efisiensi tertinggi adalah 3,20 eV dan efisiensi terendah 3,29 eV. Morfologi dari nanopartikel  $\text{TiO}_2$  didoping ruthenium adalah *nanoplate* dengan fasa anatase. Banyaknya persentase berat atom *Ru* efisiensi tertinggi 1,3% dan terendah 0,6%.

Kata kunci: DSSC, Nanopartikel  $\text{Ru/TiO}_2$ , doping, ruthenium, LPD.



# SYNTHESIS AND CHARACTERIZATION OF NANOPATE TITANIUM DIOXIDE DOPED BY RUTHENIUM FOR DYE-SENSITIZED SOLAR CELL APPLICATION

## ABSTRACT

It has been undertaken the synthesis and characterization of nanoplate titanium dioxide doped by ruthenium for dye-sensitized solar cell application. In this research,  $\text{TiO}_2$  nanoparticles doped with ruthenium in which proliferated by using Liquid Phase Deposition method for 10 hours. Doping concentration used was without, 0.15625 mM, 0.3125 mM, 0.625 mM, 1.25 mM, and 2.5 mM doping. Futhermore, the results of characterization of nanoplate was done by UV-Vis, FESEM, and XRD tools. The nanoplate titanium dioxide doped by ruthenium ( $\text{Ru/TiO}_2$ ), then integrated into the sandwich-type device. The performance of solar cell components measured by Gamry tool. Based on the results, it is found that the highest efficiency of doping concentration was obtained of 0.3125 mM in the amount of 0,53% with Resistance Charge Transport ( $R_{CT}$ ) 31.6 as the value. Whereas, the lowest efficiency of doping concentration was obtained at 2.5 mM in the amount of 0.08% with  $R_{CT}$ 45.38 as the value. The highest efficiency of energy gap was 3.20 eV and the lowest efficiency was 3.29 eV. Morphology of  $\text{TiO}_2$  nanoparticles doped with ruthenium is nanoplate in anatase phase. The highest number of weight percentage of Ru atom was 1.3% and the lowest was 0.6%.

Keywords: DSSC, Nanoparticles  $\text{Ru/TiO}_2$ , doping,ruthenium, LPD.

