

Supplementary Information

Improvement efficiency of dye-sensitized solar cell using Eu^{3+} modified TiO_2 nanoparticles as a secondary layer electrode

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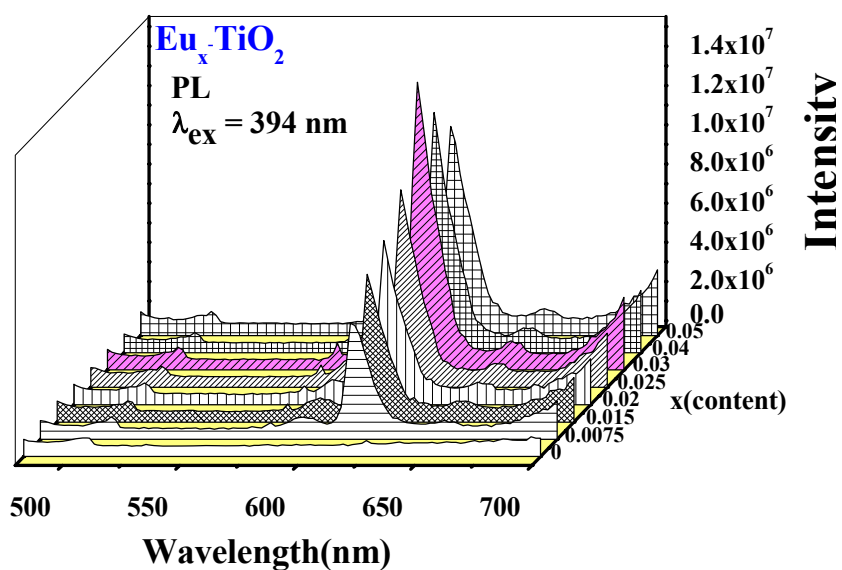


Figure S1. Photoluminescence spectra for $\text{Eu}_x\text{-TiO}_2$ with $x = 0, 0.0075, 0.015, 0.02, 0.025, 0.03, 0.04$ and 0.05 .

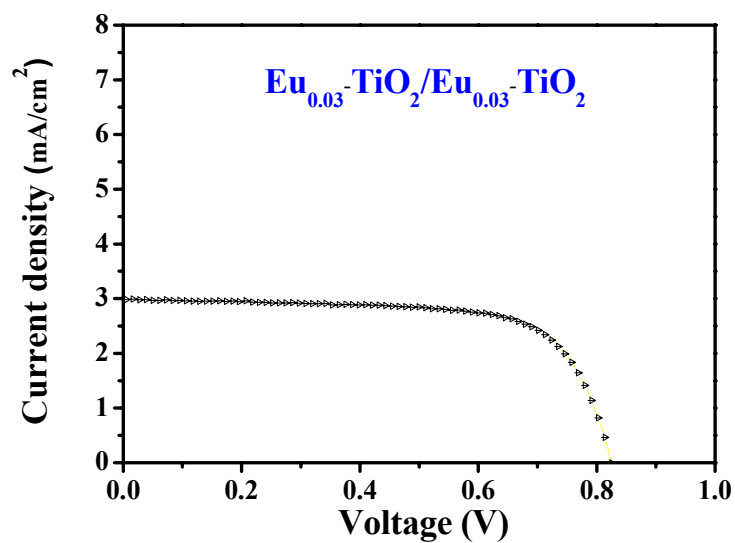


Figure S2. Voltage (V) as a function of current density (J) for double-layered electrode, which is constructed by using unmodified TiO₂ for two layers.

Table S1. Result for curve of current density (J) vs. potential for only Eu³⁺_{0.03} modified TiO₂ electrode

Structure	V _{OC} (V)	J _{SC} (mA/cm ²)	FF	η (%)
only Eu ³⁺ _{0.03} modified TiO ₂	0.82	2.99	0.58	1.78(2)