



Sol-Gel Derived Cu(In,Ga)Se₂ Thin Film Solar Cell

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Source: Journal of Nanoelectronics and Optoelectronics, Volume 12, Number 4, April 2017, pp. 352-358(7)

Publisher: American Scientific Publishers

Abstract:

Well crystallized copper indium gallium (di)selenide-Cu(In,Ga)Se₂ (CIGS) thin films were deposited on conducting substrates (molybdenum coated soda-lime glass) by sol-gel dip coating technique. The *n*-type cadmium sulfide (CdS) buffer layer was produced by chemical bath deposition (CBD) technique and the *n*-type ZnO:Al thin film has been used as transparent conductive layer was deposited by sol-gel dip coating technique. The selenium powder was dissolved in trioctylphosphine (TOP, 90%, technical grade) solution during the experiment process to make some progress on scientific innovation of CIGS thin films derived by sol-gel dip coating technique. Hence, the heterojunction at Mo/CIGS/CdS/ZnO:Al/Al configuration was produced on a soda-lime silicate glass substrate (SLSG). SLSG/Mo/CIGS/CdS/ZnO:Al/Al heterojunction was fabricated by using a practical economical and more eco-friendly technique. The structural, optical and current-voltage (*I*-*V*) characteristics of the CIGS based heterojunction was analysed by using the SLSG/Mo/CIGS/CdS/ZnO:Al/Al device configuration. The optoelectronic properties such as the open-circuit voltage (*V*_{oc}), the short-circuit current (*I*_{sc}), the fill factor (FF), the ideality factor (*n*) etc. of the CIGS thin film solar cells were examined depending on the annealing temperature at 500 °C for 45 minutes in air. The CIGS thin film heterojunctions which has been obtained present diode like rectifying behaviour besides photovoltaic behaviour under UV illumination.

Keywords: CIGS; DIODE; SOLAR CELL; SOL-GEL; THIN FILM

Document Type: Research Article

DOI: <https://doi.org/10.1166/jno.2017.2023>

Publication date: 01 Nisan 2017 Cumartesi

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Yazarlar: Utku Canci Matur ve Nilgun Baydogan

Makale İsmi: Sol-gel derived Cu(In,Ga)Se₂ Thin Film Solar Cell

SCI Indexli Dergi İsmi: Journal of Nanoelectronics and Optoelectronics

DOI: <https://doi.org/10.1166/jno.2017.2023>