Issue 6, 2024

Previous | Next

From the journal:
Journal of Materials Chemistry C

Polymer-assisted crystal growth regulation and defect passivation for high-performance flexible solar-blind photodetectors based on copper-based halides †

Chengjun Liu [a], Yuyi Zhang [a], Lixi Wang [b], Jianhua Chang [b], Qing Li [a], Xiaobing Zhang [a], Byung Seong Bae [c], Omolola Esther Fayemi [d], Xiaobao Xu [a], Jiangyong Pan *[b], Jing Chen *[a] and Wei Lei *[a]

Author affiliations

* Corresponding authors

[a] Joint International Research Laboratory of Information Display and Visualization, School of Electronic Science and Engineering, Southeast University, Nanjing, China
E-mail: chenjing@seu.edu.cn, lw@seu.edu.cn

[b] School of Electronic and Information Engineering, Nanjing University of Information Science & Technology, Nanjing, China
E-mail: pjy@nuist.edu.cn

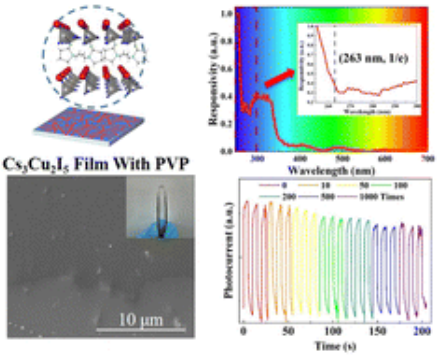
[c] Department of Electronics & Display Engineering, Hoseo University, Hoseo Ro 79, Asan City, Chungnam 31499, Republic of Korea

[d] Department of Chemistry, School of Mathematics and Physical Sciences, Faculty of Natural and Agricultural Sciences, North-West University, Mafikeng Campus, Private Bag X2046, Mmabatho 2735, South Africa

Abstract

Solar-blind ultraviolet photodetectors have attracted great attention owing to the low background noise and high reliability in operating environments. In this work, we regulated the crystallization of the $Cs_3Cu_2I_5$ film and passivated defects using a polyvinyl pyrrolidone (PVP) assisted method. As a result, high-quality $Cs_3Cu_2I_5$ films with compact surfaces, high carrier mobility and fewer defects are obtained. On this basis, the PVP–$Cs_3Cu_2I_5$ photodetector exhibits a high specific detectivity and responsivity of 1.85×10^{12} Jones and 0.52 A W^{-1}, along

with a superior EQE of 45%. Moreover, the flexible PVP–$Cs_3Cu_2I_5$ device can retain 86.7% of its initial photocurrent after 1000 times bending, benefitting from the enhancement of the mechanical ductility of the $Cs_3Cu_2I_5$ film by PVP doping. This work provides a promising method for modulating the properties of the $Cs_3Cu_2I_5$ film for flexible solar-blind photodetectors by suitable polymer additives.



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Supplementary information
PDF (1580K)

Article information

https://doi.org/10.1039/D3TC04308H

Article type
Paper

Submitted
22 Nov 2023

Accepted
30 Dec 2023

First published
03 Jan 2024

Citation
J. Mater. Chem. C, 2024, **12**, 1965-1971