Abstract Book of the 2024 International PhD School on Perovskite PV
http://www.sciencepublishinggroup.com/ISBN/979-8-88599-107-0/037

Solution Processability of Cu_2AgBiI_6 Films for Flexible Photovoltaic Applications

Ville Holappa[1, 2, *], Riikka Suhonen[1], Thomas M. Kraft[1], Paola Vivo[2]

[1]Sensing Solutions, VTT Technical Research Centre of Finland Ltd, Oulu, Finland

[2]Hybrid Solar Cells, Faculty of Engineering and Natural Sciences, Tampere University, Tampere, Finland

Email address:

ville.holappa@vtt.fi (Ville Holappa), riikka.suhonen@vtt.fi (Riikka Suhonen), thomas.kraft@vtt.fi (Thomas M. Kraft), paola.vivo@tuni.fi (Paola Vivo)

[*]Corresponding author

Abstract

Lead-based perovskites have shown remarkable potential for photovoltaic applications. However, due to the environmental concerns and toxicity issues related to lead, there is a growing interest in reducing the use and increasing recycling of hazardous chemicals, while exploring lead-free alternatives. In this study, we investigate a lead-free perovskite-inspired material as a promising photo-active layer for indoor photovoltaic applications. We focus on a lead-free perovskite, inspired material that is made from copper silver bismuth iodide (Cu_2AgBiI_6, CABI). Recent studies demonstrate that this material exhibits favorable properties for indoor photovoltaic applications. It possesses a suitable bandgap for efficient light absorption under indoor lighting conditions. In addition, CABI exhibits good stability under ambient conditions, making it an interesting candidate for indoor photovoltaic applications. This material has proved to be solution-processable, allowing the use of flexible substrates, low-cost, and scalable fabrication techniques. We employed facile solution processing routes such as spin coating, slot-die coating, and gravure printing to fabricate thin films of CABI. We utilized techniques such as UV-Vis spectroscopy and scanning electron microscope to analyze the material's light absorption characteristics and thin film morphology. Furthermore, device fabrication on flexible substrates (PET/ITO/SnO_2/CABI/P3HT/Au) proved to yield similar performances as those devices fabricated on glass. In conclusion, our study demonstrates the promise of CABI as a sustainable and eco-friendly alternative for lead-based perovskites. Preliminary results highlight the potential of CABI for use in indoor energy harvesting photovoltaic applications.

Keywords

Lead-Free, Perovskite-Inspired Materials, Solar Cells, Flexible Substrates

Acknowledgments

The work is part of the Research Council of Finland Flagship Programme, Photonics Research and Innovation (PREIN), decision number 346545. This work was supported by the Research Council of Finland, Printed intelligence infrastructure funding, decision 35862.