

# Universal encapsulation adhesive for lead sedimentation and attachable perovskite solar cells with enhanced performance.

Xuehao Zhu<sup>1</sup>, Haoyu Cai<sup>1</sup>, Cong Bai<sup>1</sup>, Wenjian Shen<sup>1</sup>, Yiming Xiong<sup>1</sup>, Juan Zhao<sup>1</sup>, Fuzhi Huang<sup>1</sup>, Yi-Bing Cheng<sup>1</sup>, and Jie Zhong<sup>1</sup>

<sup>1</sup>Wuhan University of Technology

March 1, 2023

## Abstract

In this work, a modified polyurethane adhesive (PUA) was prepared to realize a convenient encapsulation strategy for lead efficient sedimentation and for attachable perovskite solar cells (PSCs). The modified PUA can completely self-healing within 45 minutes at room temperature and it has a lead ion blocking rate of 99.3% in the dripping experiment. The PUA film can directly contact with the metal electrode surface with a slight efficiency improvement from 23.96% to 24.15%. The thermal stability of 65 and humidity stability of 55% RH is superior to the encapsulated devices with polyisobutylene. The PUA film has strong adhesion to flexible substrate, and the initial efficiency of flexible perovskite module (17.2%) encapsulated by PUA remains 92.6% within 1825 h. These results suggest PUA encapsulation route is universal for rigid and flexible PSCs with enhanced stability and low lead hazardous. Moreover, it was found that the flexible PSCs can be well attached to varied substrates with PUA, providing a facile route for the attachable PSCs in various scenarios without additional encapsulation and installation.

## Hosted file

Manuscript.doc available at <https://authorea.com/users/590826/articles/627012-universal-encapsulation-adhesive-for-lead-sedimentation-and-attachable-perovskite-solar-cells-with-enhanced-performance>