Research Center for Photovoltaics

Pb and Pb-free Perovskite Absorbers Synthesized by Reactive Polyiodide Melt Method Applied to Photovoltaics

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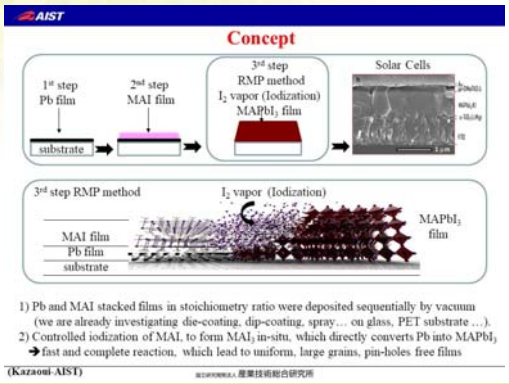
Introduction

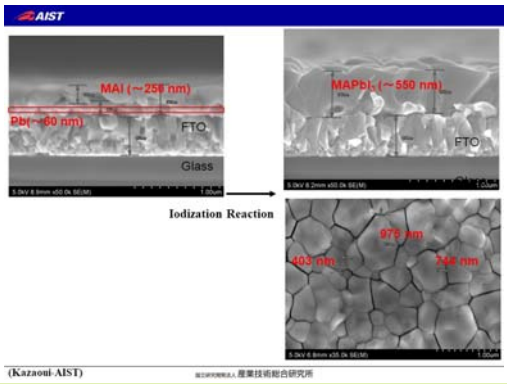
Based on the strategic advantages of "reactive polyiodide melts" method (RPM), which was jointly developed by researchers from AIST, MSU and EPFL published in Nature Nanotechnology [1], we aim at synthesizing low-toxicity Pb-free materials in order to solve the problem of toxic Pb-based Perovskite materials.

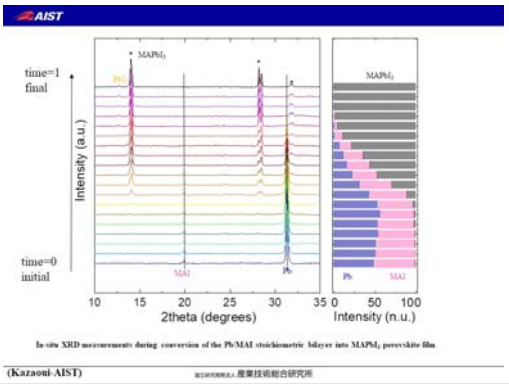
Goals

We will describe the "reactive polyiodide melt" method (RPM) and its application to Pb-based Perovskite solar cells (PVs). Then, we will demonstrate that this approach is also suitable to synthesize Pb-free materials with either Perovskite or non-Perovskite crystal structure. Our long-term goal is to fabricate low-toxicity Pb-free PVs.

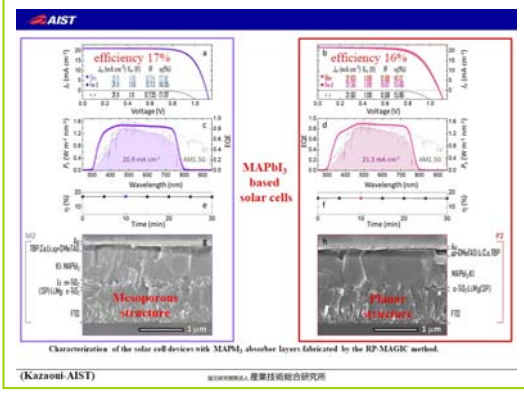
Pb-based perovskite materials

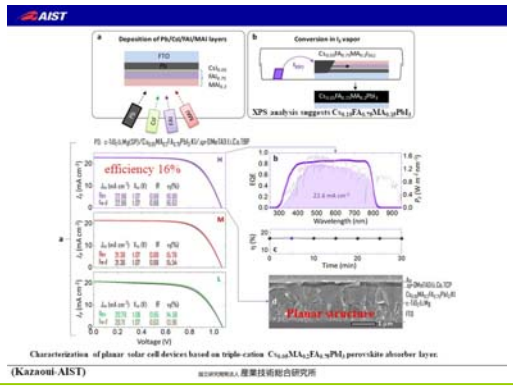


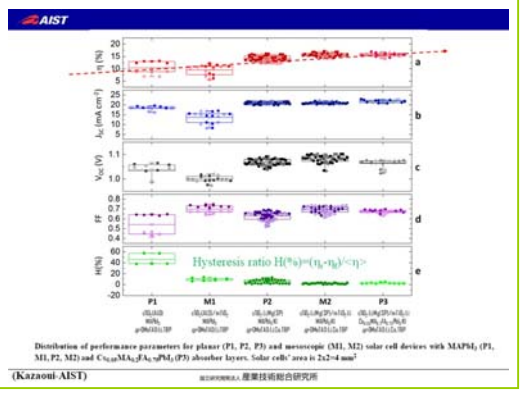




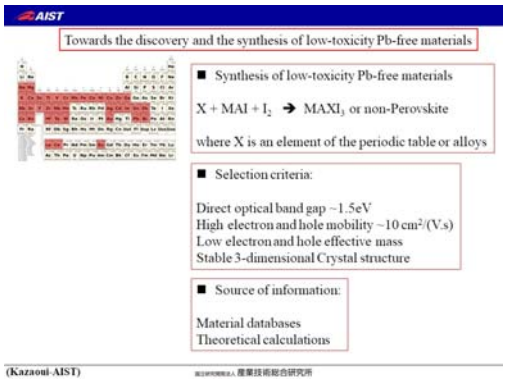
Pb-based $MAPbI_3$ and $(Cs,FA,MA)PbI_3$ perovskite PVs

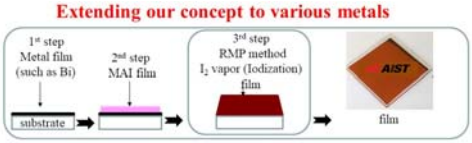


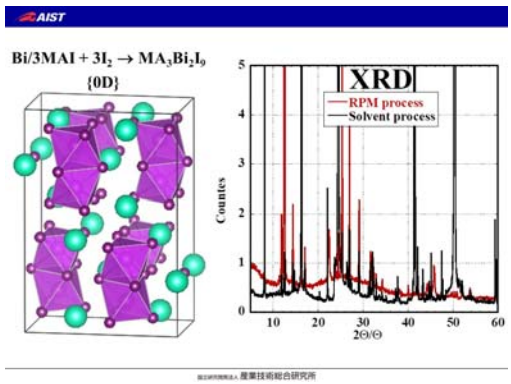




Pb-free perovskite and non-perovskite materials







Conclusions

We have demonstrated that "reactive polyiodide melt" method (RPM) is suitable:

- To fabricate of Pb-based Perovskite solar cells with efficiency as high as 17%
- To synthesize Bi-based materials and to explore a wide range of Pb-free materials

Our long-term goal is to discover, synthesize and fabricate low-toxicity Pb-free PVs.

References and Acknowledgements

References:
[1] "Strategic advantages of reactive polyiodide melts for scalable perovskite photovoltaics" I. Turkevych, S. Kazaoui, N. A. Belich, A. Y. Grishko, S. A. Fateev, A. A. Petrov, T. Urano, S. Aramaki, S. Kosar, M. Kondo, E. A. Goodilin, M. Graetzel, A. B. Tarasov Nature Nanotechnology 14, 57-63 (2019).

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