MATERIALS

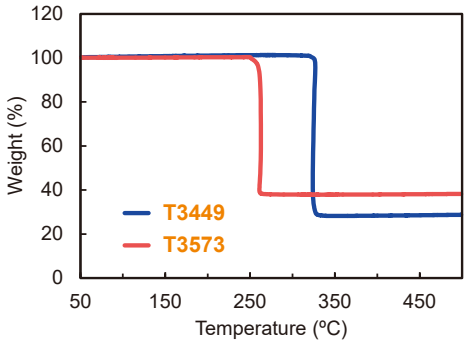
Perovskite Precursors
Tin(II) Iodide, Tin(II) Bromide

SnI_2 — Tin(II) Iodide
[for Perovskite precursor]
1g / 5g
[T3449]

$SnBr_2$ — Tin(II) Bromide
[for Perovskite precursor]
1g / 5g
[T3573]

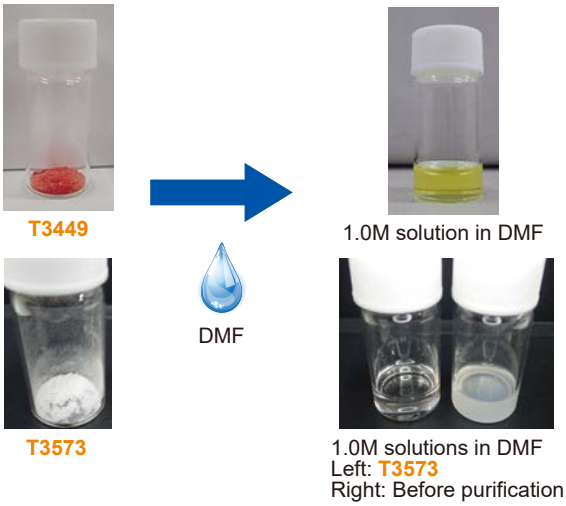
Advantages

- High purity crystalline solids
- Extremely low Sn(IV) content
- Provide clear DMF solutions
- Low water content (T3449 : Water < 100 ppm)



Thermogravimetric (TG) analysis of T3449 and T3573

- T3449 exhibits no mass loss at *ca.* 150 °C indicating absence of SnI_4.
- Single mass drop based on SnI_2 or $SnBr_2$.



- T3449 and T3573 provide clear DMF solutions suitable for perovskite precursors.

Applications for Perovskite Solar Cells (PSC)

SnI_2 and $SnBr_2$ have been widely applied to lead-free and mixed metal perovskite solar cells.

Examples of solvent-coordinated tin halide complexes as tin perovskite precursors

1) M. Ozaki, Y. Shimakawa, Y. Kanemitsu, A. Saeki, A. Wakamiya, *et al.*, *ACS Omega* **2017**, *2*, 7016.

Examples of lead-free perovskite solar cell research

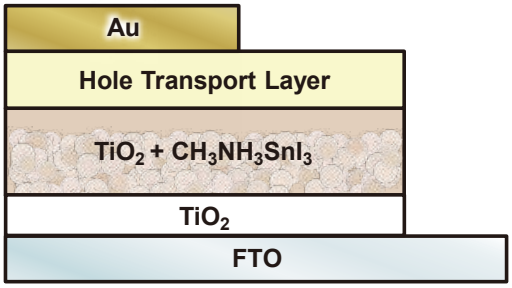
2) (PCE 11.5% $FA_{0.75}MA_{0.25}SnI_3$ in situ Sn(0) nanoparticle treatment) T. Nakamura, T. Sasamori, H. Ohkita, Y. Kanemitsu, A. Wakamiya, *et al.*, *Nat. Commun.* **2020**, *11*, 3008.

3) (PCE 9.0% $PEA_2FA_{24}Sn_{25}I_{76}$) S. Shao, J. Liu, G. Portale, H. Fang, G. R. Blake, G. H. ten Brink, L. J. A. Koster, M. A. Loi, *Adv. Energy Mater.* **2018**, *8*, 1702019.

Examples of mixed metal perovskite solar cell research

4) (PCE 14.8% $FA_{0.75}Cs_{0.25}Sn_{0.5}Pb_{0.5}I_3$ (single) 20.3%(tandem)) M. D. McGehee, H. J. Snaith, *et al.*, *Science* **2016**, *354*, 861

5) (PCE 21.4% $Cs_{0.1}FA_{0.6}MA_{0.3}Sn_{0.5}Pb_{0.5}I_3$ by maltol post-treatment) S. Hu, M. A. Truong, K. Otsuka, T. Handa, T. Yamada, R. Nishikubo, Y. Iwasaki, A. Saeki, R. Murdey, Y. Kanemitsu, A. Wakamiya, *Chem. Sci.* **2021**, *12*, 13513.



Typical device structure of lead-free perovskite solar cells

These products were commercialized by collaboration with Prof. Atsushi Wakamiya.

Perovskite Precursors: Tin (II) Iodide, Tin (II) Bromide

Related Products

Cation \ Anion	Iodide	Bromide	Chloride
Lead	L0279	L0288	L0291, L0292
Cesium	C2205	C2202	C2203
Bismuth	B5787	B6339	B3546
Methylammonium	M2556	M2589	M0138
Formamidinium	F0974	F0973	F0103
Acetamidinium	A2902	A3292	A0008
Guanidinium	G0450	G0449	G0162
Ethylammonium	E1045	E0056	E0205
Propylammonium	P2212	P2502	P0522
Isopropylammonium	I0934	I1041	I0166
Butylammonium	B4433	B5186	B0710
Isobutylammonium	I0935	I1007	I0096
tert-Butylammonium	B4434	B5187	-
Dimethylammonium	D4555	D5092	D0644
Diethylammonium	D4643	D4667	D0468
Imidazolium	I0970	I1006	-
Phenylammonium	A2778	A2985	-
Benzylammonium	B4566	B5185	B0407
2-Phenylethylammonium	P2213	P2388	P0086
5-Aminovaleric Acid	A2984	A3094	A0436

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