Supporting information

In situ Investigation of Water Interaction with Lead-Free All Inorganic Perovskite ($Cs_2SnI_xCl_{6-x}$)

Weiguang Zhu[†], Tiankai Yao[†], Junhua Shen[‡], Wenqian Xu[§], Bowen Gong[†], Yachun Wang[†], Jie Lian[†,*]

[†]Department of Mechanical, Aerospace and Nuclear Engineering and [‡]Department of Materials Science and Engineering, Rensselaer Polytechnic Institute, Troy, New York 12180, United States

[§]X-ray Science Division, Advanced Photon Source, Argonne National Laboratory, Lemont, Illinois 60439, United States

AUTHOR INFORMATION

Corresponding Author

*Email: lianj@rpi.edu

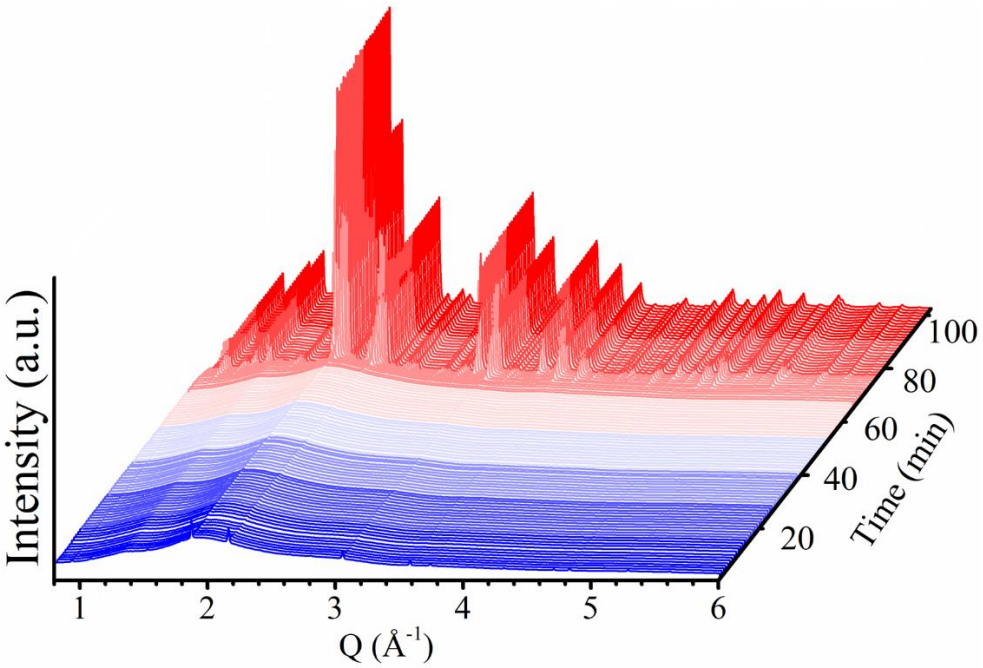

Figure S1. Series of diffraction patterns of Cs_2SnI_6 recorded during in situ experiment with water addition at room temperature.

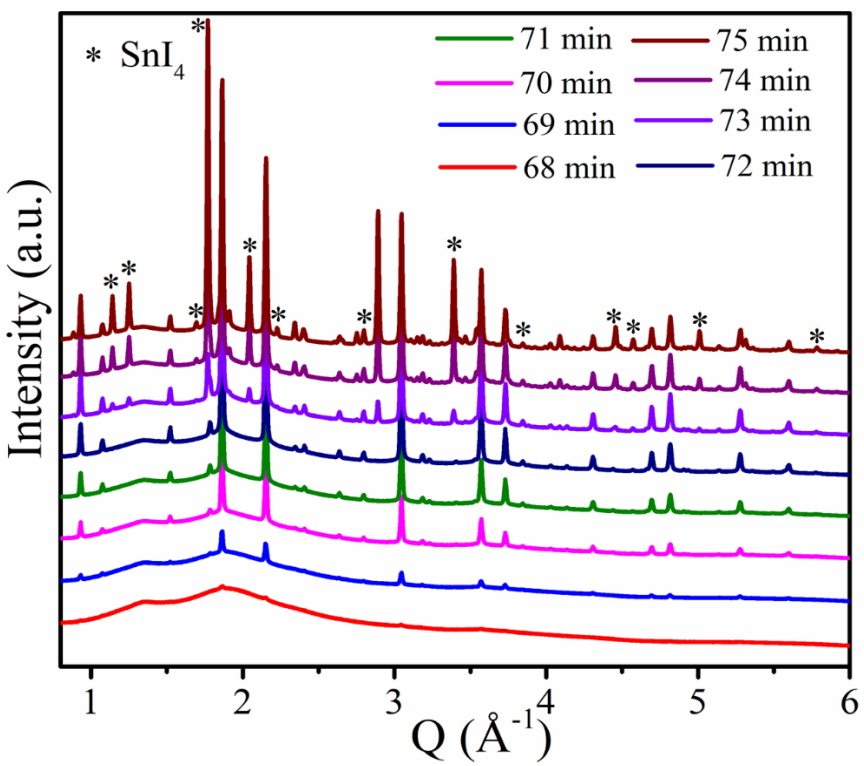

Figure S2. In situ synchrotron diffraction patterns of Cs_2SnI_6 collected during the dehydration process.

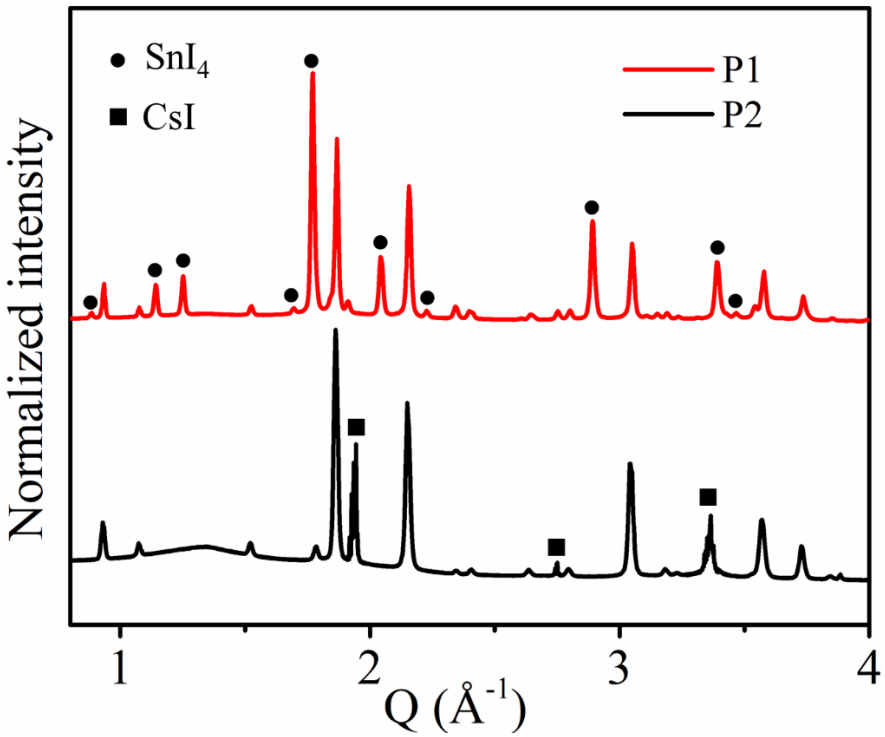

Figure S3. Synchrotron X-ray powder diffraction patterns of the dehydrated Cs_2SnI_6 sample obtained at various locations. CsI and SnI_4 can be identified, respectively.

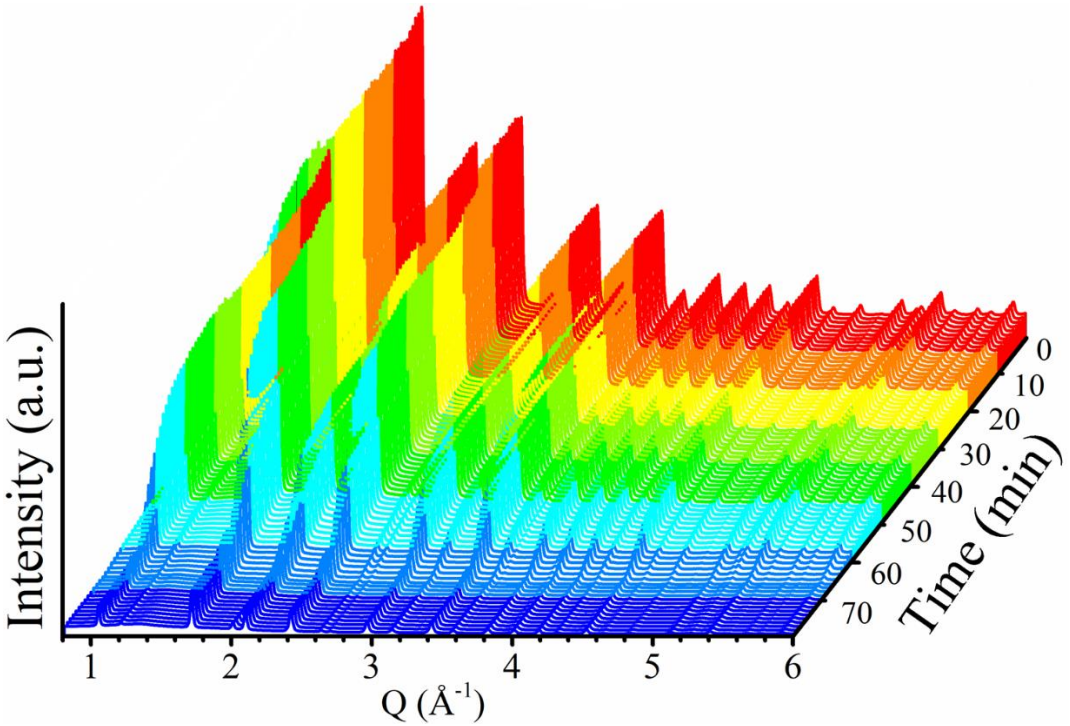

Figure S4. In situ synchrotron X-ray diffraction patterns of Cs_2SnCl_6 upon water addition.

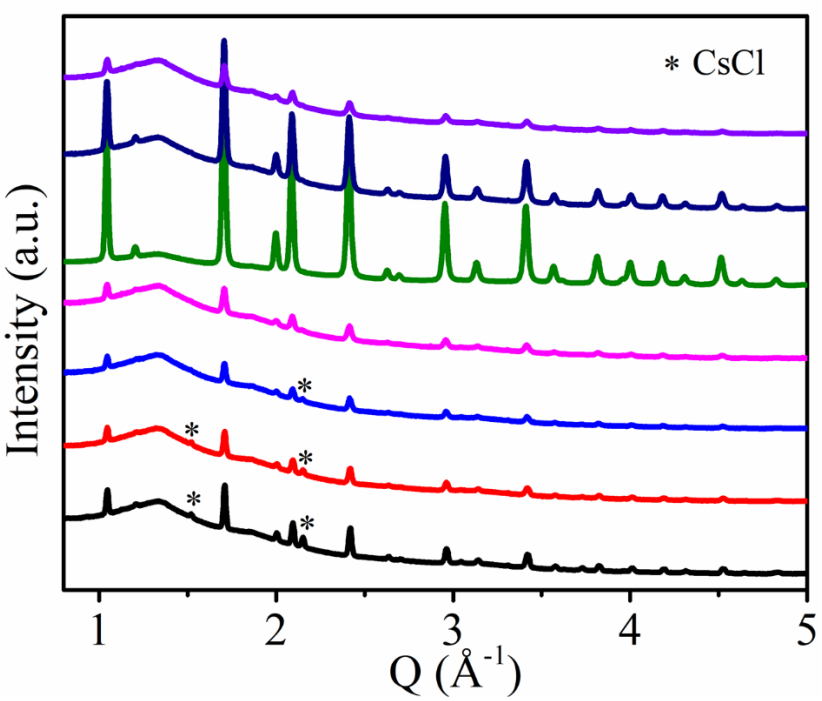

Figure S5. X-ray diffraction patterns mapping of the dried Cs_2SnCl_6 sample. From top to bottom the scans were taken at 1 mm interval along the tubing direction.

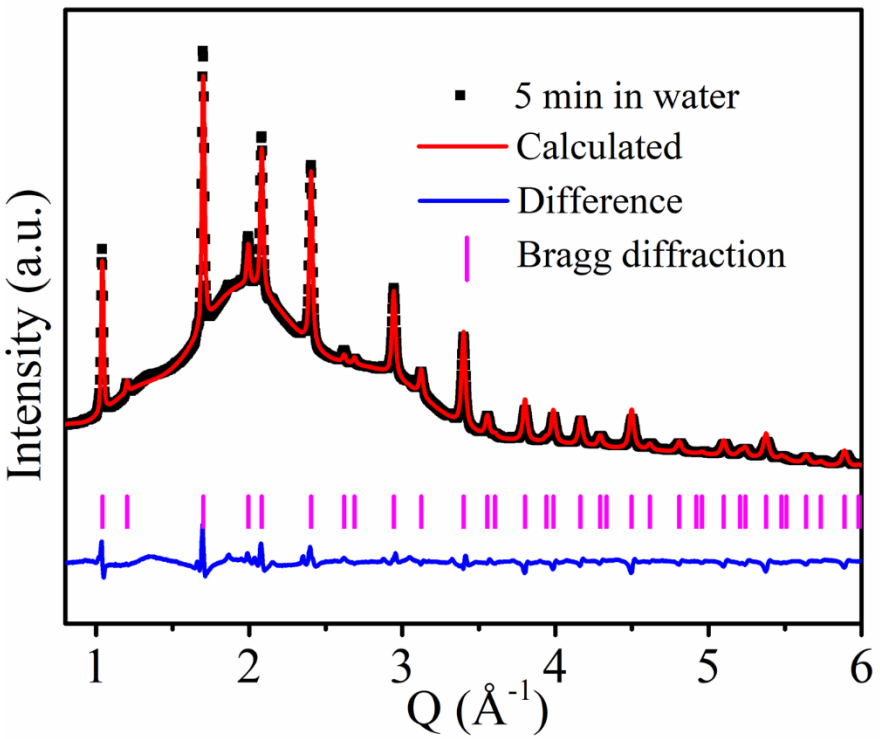

Figure S6. Rietveld refined X-ray diffraction pattern of $Cs_2SnI_{0.9}Cl_{5.1}$ in water for 5 mins. The composition changes to $Cs_2SnI_{0.12}Cl_{5.88}$. Black squares are the observed data, the red lines are the fittings, and the blue lines represent difference, and the corresponding Bragg diffractions are the purple sticks.

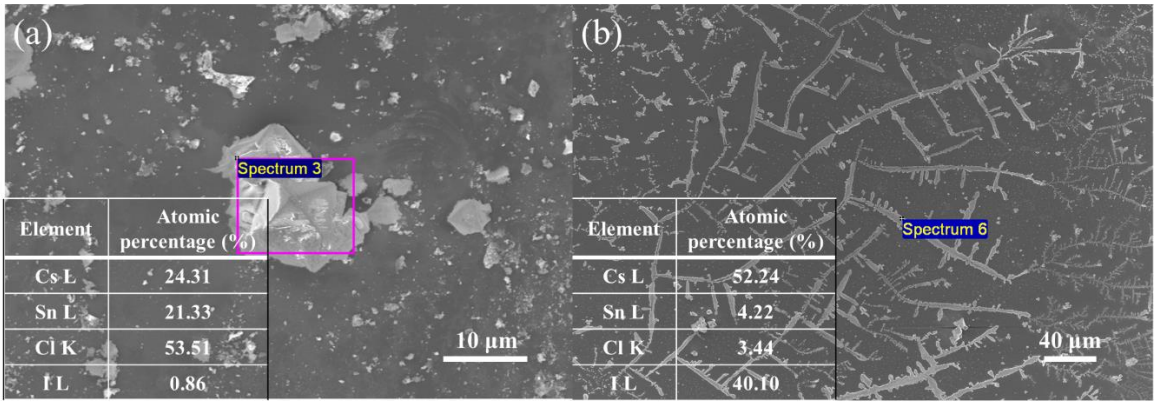

Figure S7. EDX atomic percentages of all elements on (a) hexagonal crystals, and (b) dendrites from the post in situ Raman test.