

## Supplementary Information

### A facile aqueous solution route for the growth of chalcogenide perovskite BaZrS<sub>3</sub> films

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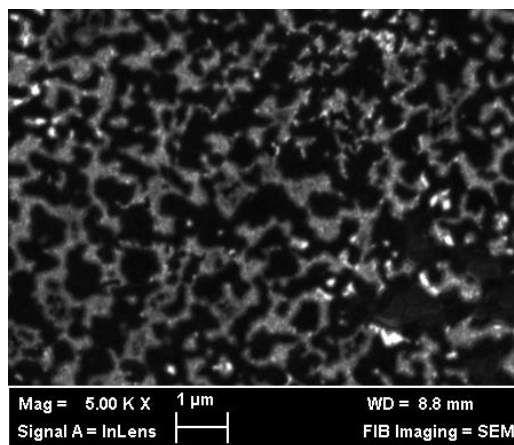
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#### An example of detailed procedures to conduct ICP-ES analysis of precursor solution

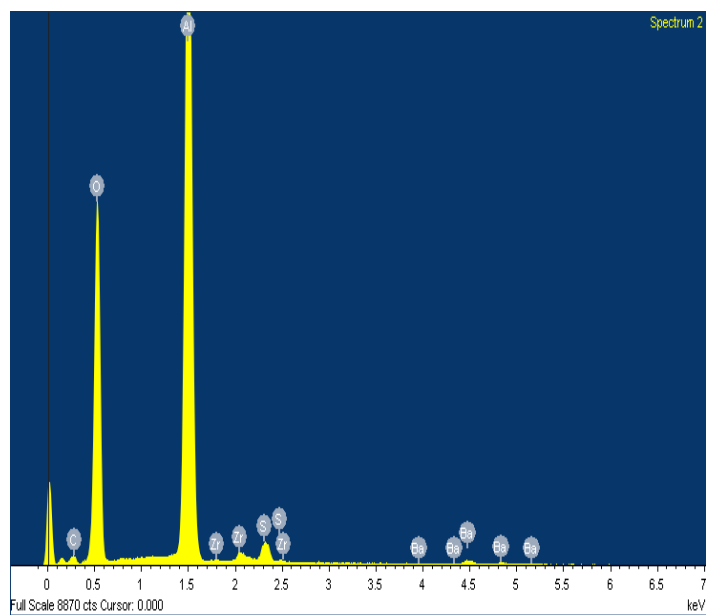
Prior to measurements, metal-polymer precursor solutions were diluted to below 200 ppm levels due to instrumental limitations. The Ba-PEI solution was diluted by taking 0.3 g of the precursor and adding it to 50 g of water. The concentration of this solution was measured to be 116 ppm by weight and the concentration of the Ba ions in the precursor was calculated to be 5826 ppm, indicating the Ba-PEI solution had a Ba<sup>2+</sup> concentration of 143 mM. Similarly, the concentration Zr<sup>4+</sup> ions in the final Zr-PEI solution was determined to be 9419 ppm and therefore, 106 mM.

#### Surface morphology and energy-dispersive x-ray analysis of BaZrS<sub>3</sub> films

The surface morphology of the BaZrS<sub>3</sub> films was inspected by scanning electron microscopy (SEM) using a Focused Ion Beam Scanning Electron Microscope (FIB-SEM) – Carl Zeiss AURIGA CrossBeam with an Oxford energy-dispersive x-ray system.



**Figure S1.** SEM image of BaZrS<sub>3</sub> film deposited by polymer-assisted deposition, where the precursor film was annealed at 900 °C.



**Figure S2.** Energy-dispersive x-ray spectrum of a BaZrS<sub>3</sub> film grown by polymer-assisted deposition.