

## Method for the Synthesis of Chalcogenide Perovskite Films for Semiconductor Applications

**Track Code:** 2022-AGRA-69825

**Categories:**

- Chemical Engineering
- Materials and Manufacturing

**Keywords:**

- Barium zirconium sulfide
- Chalcogenide perovskite
- Chemical Engineering
- Distorted perovskite
- Ruddlesden-Popper
- Semiconductor materials
- Solution-processed

Researchers at Purdue University have developed a new method to synthesize chalcogenide perovskites. Chalcogenide perovskites have both excellent optoelectronic properties, including a direct bandgap and high absorption coefficient, and a high intrinsic stability. This makes them an enticing class of materials for semiconductor applications, including photovoltaics. However, chalcogenide perovskite synthesis is challenging, generally requiring high temperatures (often > 800 degrees Celsius), negatively affecting the structure of the contact layer between the perovskite and the semiconductor substrate. Purdue researchers have developed a method that involves solution-phase delivery of at least one of the metals that forms the perovskite and a lower temperature treatment step. This method is the first to successfully synthesize a chalcogenide perovskite film that is compatible with semiconductor applications.

**Technology Validation:** The chalcogenide perovskite synthesized by the researchers showed the same peaks in the X-ray diffraction (XRD) and Raman spectra as the standard.

**Advantages:**

- lower temperature synthesis
- compatible with semiconductor applications

**Applications:**

- PV cells
- LEDs
- water-splitting devices
- field effect transistors

**People:**

- Agrawal, Rakesh (Project leader)
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**Intellectual Property:**

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