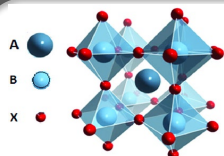


STATUS QUO



Perovskites are a family of crystalline compounds with a unique crystal structure.

Figure 1: Chemical formula of a perovskite  $ABX_3$ . The diagram shows a 3D lattice structure with A (blue), B (red), and X (grey) ions.

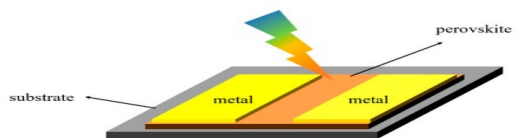
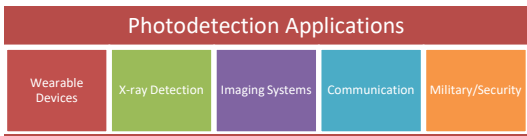


Figure 2. Photoconductor structure diagram. <https://doi.org/10.3390/nano12244390>

SOLUTION

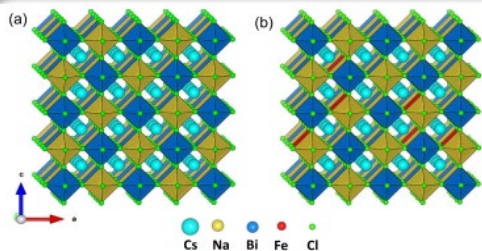


Figure 3. (a) Crystal structure of  $Cs_2NaBiCl_6$ , (b) Fe-doped  $Cs_2NaBiCl_6$  double perovskite sample. <https://doi.org/10.1021/acs.inorgchem.2c04149>

- Doping perovskite with iron with the goal of improving certain performance factors.

## RESEARCH METHODS

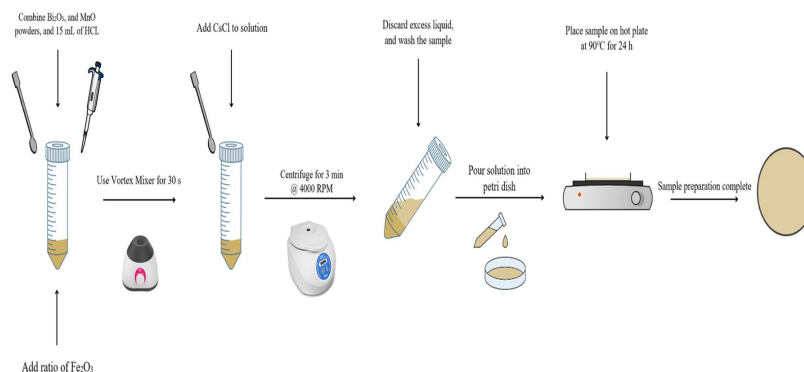


Figure 4. Fabrication process to create doped perovskite samples

Sample #	Temperature	Mixing Time	Fe (III) Ratio
1	125°C	1 hour	1 mmol
2	125°C	2 hours	1 mmol
3	125°C	1 hour	0.5 mmol
4	125°C	2 hours	0.5 mmol
5	180°C	1 hour	1 mmol
6	180°C	2 hours	1 mmol
7	180°C	1 hour	0.5 mmol
8	180°C	2 hours	0.5 mmol

Table 1. Experimental Design for Doped Perovskite Powder Synthesis

ANTICIPATED IMPACT

- Enhance the light-harvesting range of the microcrystals
- Expand the absorption spectra of the microcrystals
- Confirm that iron alters the crystal structure
- Maintain thermal stability and improve humidity stability
- Exceed the previous photoluminescence quantum yield (PLQY) of 25.7%

PATH FORWARD

- Learn the working principles of the characterization methods
- Enhance understanding of foundational chemistry
- Refabricate previous samples in an inert environment
- Perform characterization tests with the samples