

# 2026 HBCU CHIPS Network Conference

Contribution ID: 51

Type: ORAL

## Materials development and biophotonic sensor fabrication employing lead-free halide perovskites

*Thursday, April 2, 2026 12:25 PM (20 minutes)*

This study explored the development of a light source for a biophotonic sensor by integrating a lead-free halide perovskite-polymer composite thin film or dome on an inorganic UV LED source. This 3D organic/inorganic integrated device was designed to convert photons in the ultraviolet (UV, 350nm) wavelength range to 600nm light using a fluorescence process. The selected halide perovskites fluorescence material Cs<sub>4</sub>MnBi<sub>2</sub>Cl<sub>12</sub> (CMBC) was synthesized via a precipitation method or by hydrothermal synthesis, employing commercial precursors of CsCl, MnCl<sub>2</sub>·4H<sub>2</sub>O, and Bi<sub>2</sub>O<sub>3</sub> (or BiCl<sub>3</sub>). Er doped CMBC was also prepared for enhanced visible light emission. CMBC can be considered as a possible non-toxic alternative to the well-known halide perovskites containing lead (e.g. CsPbCl<sub>3</sub>). Following optical excitation at 360nm the undoped CMBC and Er: CMPC samples exhibited a broad band, orange-red emission centered at ~605nm. In addition, the Er: CMBC sample also revealed a distinct visible emission centered at ~650nm from an Er<sup>3+</sup> intra-4f transition. For biophotonic sensor applications, prototype filters were prepared with varying concentrations of CMBC and either UV resin or cyanoacrylate adhesive in the composite film. This allowed for a comparison between filtered and unfiltered emission spectra, specifically targeting changes in transmittance at selected wavelengths.

### Academic or Professional Status

Faculty

**Author:** GEDDIS, Demetris (Hampton University)

**Co-authors:** Mr MCCRAY III, Breon (Hampton University); Dr HOMMERICH, Uwe (Hampton University); Dr GHEBREYESSUS, Kesete (Hampton University); Ms TERIBA, Folashade (Hampton University); Ms EMEHEL, Madison (Hampton University); Ms NELSON, Simone (Hampton University)

**Presenter:** GEDDIS, Demetris (Hampton University)

**Session Classification:** Technical Session 3

**Track Classification:** Advanced Packaging