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Introduction

- Internet of things needs a new computing system with high-speed operation, low power consumption, and high scalability
- Organic halide perovskite memristors show strong hysteresis, simple structure, easy synthesis and unique optical and electronic properties
- The development for perovskites is hampered by material instability and susceptibility to moisture, oxygen and heat

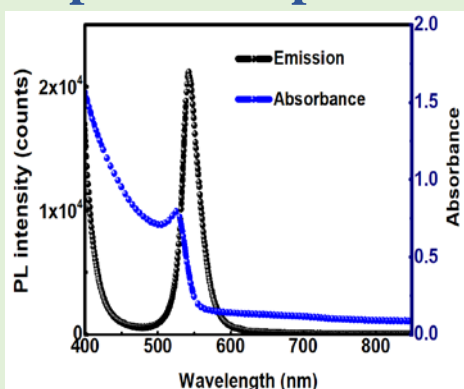
Experimental

- Synthesis: Solution synthesis
- Fabrication: Spin-coating
- Electrode Deposition: Thermal evaporation
- Device structure: Metal-Insulator-Metal

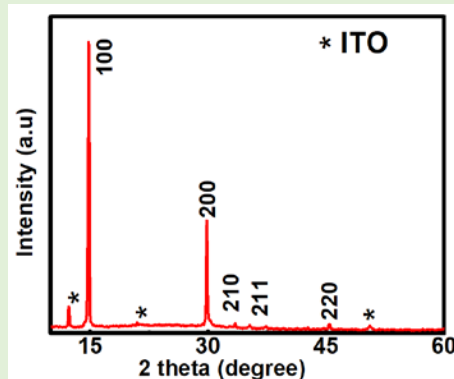
Fabrication



Optical Properties Crystal structure Analysis

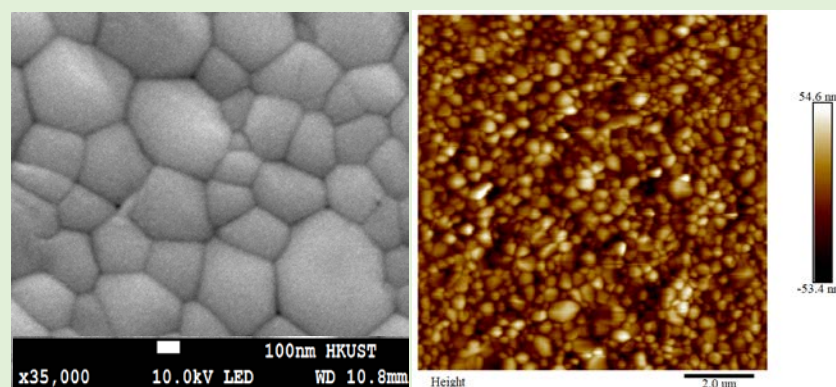


UV-VIS and PL spectra of FAPbBr₃



X-ray diffraction analysis

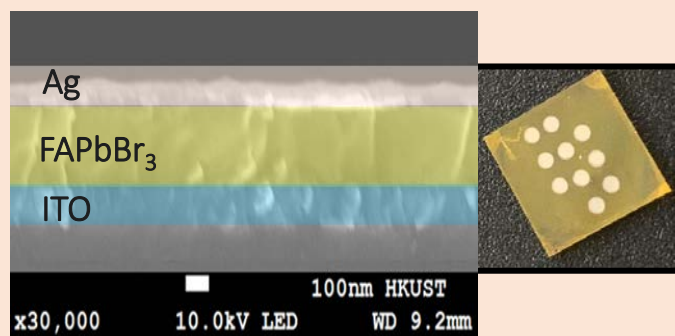
Morphological analysis



Scanning electron and atomic force microscopic image

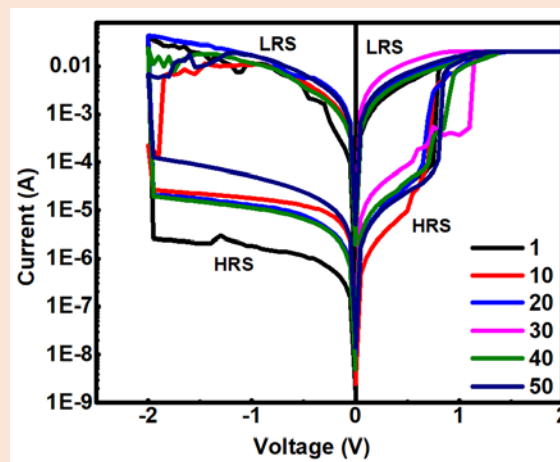
Device structure

ITO/FAPbBr₃/Ag

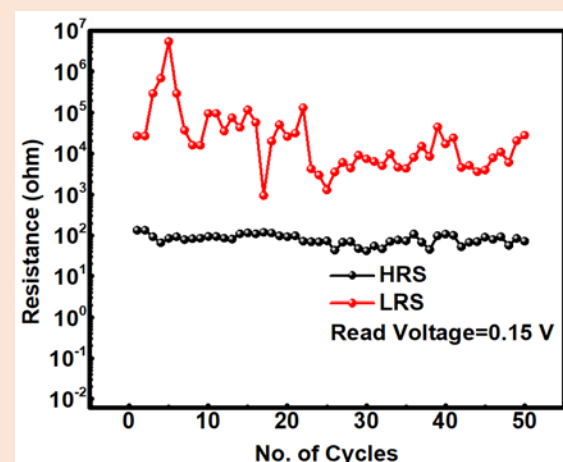


SEM cross-section and the real device

Device Characterization



Semi log IV plot, switching between low current and high current state



HRS and LRS for 50 cycles

Conclusion and Future Prospects

- Crystalline, uniform and smooth FAPbBr₃ thin films having cubic structure and 2.27 eV band gap energy were formed successfully
- As a result of DC sweep from -2.5 V → +2.0 V the devices showed bipolar switching with electroforming voltage ranging from 0.8 to 1.1 V
- The endurance of devices is 50 cycles and on/off ratio is around 10²
- The HRS is fluctuating more as compared to LRS
- Bipolar switching, environmental and thermal stability and the IV results make this material potential candidate for future memristors

References

- Zhang Y. et al. *ACS Energy Letters* (2018): 1808-1814.
- Zeng F. et al. *ACS Applied Materials & Interfaces* (2020): 23094-23101.

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