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ABSTRACT:

Halide Perovskites: Mixed Electronic and Ionic Conductors for Memristive Devices

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Halide perovskites have been noted for their exotic properties such as fast ion migration, tunable composition, facile synthetic routes, and flexibility in addition to large light absorption coefficients, long carrier diffusion lengths, and high defect tolerance. These properties have made halide perovskites promising materials for memristors. Applications in the field of resistive switching memory devices and artificial synapses for neuromorphic computing are especially noteworthy. We introduce state-of-the-art memristive devices based on halide perovskites. The fundamental mechanisms and characteristics of perovskite-based memristors are elucidated. Interesting opportunities to improve the performance of perovskite-based memristors for commercialization are discussed, including improving film uniformity and air stability, controlling the stoichiometry, finding new all-inorganic and lead-free halide perovskites, and making perovskites into single crystals or quantum dots. We expect our activities to be the foundation of realizing next-generation halide perovskite-based memristors.