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**Carrier, ion, and phonon mediated phase transitions in mixed halide perovskite nanostructures via low-exposure cathodoluminescence imaging**

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Mixed halide perovskite nanostructures support a wide variety of intriguing transport properties, be they electronic, ionic, or thermal. These transport properties are largely influenced by the structural phase and by the ionic composition. Interestingly, the local composition and structure of these materials can also be greatly affected by the transport of carriers, ions, or even heat. I will describe low-exposure, high-resolution, dynamic cathodoluminescence imaging that highlights the myriad relationships between various forms of non-equilibrium states and structures of these materials. They range from photo-induced halide demixing phase transitions in thin films and single-crystal nanoplates induced via polaronic fields to visualization and statistical characterization of structural temperature-induced phase transitions in a series of halide perovskite nanowires.