**Link:** <https://solar-power-tech.com/e-posters/psc_eposter_17-2/>

**Abstract**

Lead halide perovskites are a group of fast emerging materials for use in optoelectronic devices due to their easy and cost-effective preparation in combination with their high charge carrier diffusion lengths, high absorption coefficients, strong photoluminescence and tunable band gaps. However, their low environmental stability as well as the high toxicity of lead [1] are large drawbacks that hinder those materials from being commercially implemented. To overcome these issues, attempts have been made to substitute lead with other metals like tin or germanium, but no significant improvements in terms of stability have been achieved.[2] Instead, good perspectives are emerging from the inorganic double perovskite Cs2AgBiBr6 in which the divalent lead (Pb2+) is substituted by equal molar amounts of monovalent silver (Ag+) and trivalent bismuth (Bi3+). Although this double perovskite shows great moisture stability and low toxicity, it still lacks of optimal optoelectronic properties, mostly due to its indirect band gap and strong exciton binding energy. Options to tune those optoelectronic properties can be doping of the perovskite [3] or reducing the perovskite’s dimension when Cs+ is substituted with large organic cations to obtain a two-dimensional monolayered structure.

In our work, we demonstrate that the choice of the organic cation not only affects the perovskite’s structure and morphology such as the distances between monolayers as well as the distortion of the perovskite octahedra but also has an impact on the material’s optical features. [4] We found that exchanging a linear cation (BA) that mainly showed excitonic emission with its branched isomer (iBA) results in an emission dominated by self-trapped excitons. Additionally, atomic force and scanning electron microscopy images show that, depending on the cation, thin films either grow in a layer-by-layer fashion (BA and PEA) or as interconnected single crystals in inhomogeneous films (iBA). This interplay between morphology and optical properties provides exciting perspectives for the future implementation of a material-by-design approach in optoelectronics.