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Towards the stabilization of the FAPbI3 based active layer

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Towards the stabilization of the FAPbI3 based active layer

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In recent decades, research activity in the field of nanomaterials and nanoparticles has significantly increased, leading to a growing number of potential applications for these materials across various scientific and technological fields. One key area where this research finds immense significance is in photovoltaics, as there is a pressing need for new active materials that can facilitate more affordable energy production and meet the rapidly expanding photovoltaic energy market. Among the emerging materials, perovskites have emerged as the most promising class for current photovoltaic research. These materials have drawn considerable attention due to their potential to provide high performance, as perovskite-based solar cells have reached power conversion efficiencies comparable to those of state-of-the-art silicon cells in the laboratory environment. However, despite their impressive efficiencies, perovskite solar cells still lag behind traditional silicon-based cells in crucial aspects such as chemical and phase stability [1], [2].
One possible approach to enhancing the stability of perovskite solar cells involves the use of nanoparticles, as highlighted by Masi et al. [3]. The reason is that, due to their smaller size and the presence of ligands on their surfaces, nanoparticles can help stabilize the cubic photoactive phase of perovskite materials.
This study thus presents our ongoing research focusing on the use of formamidinium lead triiodide ($FAPbI_3$) perovskite nanoparticles as active materials in solar cell applications. For this purpose, different shapes of nanoparticles e.g. nanorods, nanoplatelets, and nanocubes, are being fabricated using a modified room temperature synthesis, following the approach described by Huang et al. [4]. These nanoparticles are then systematically compared with regarding their optical properties, such as absorption and emission, as well as their phase stability.

References

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