Contribution ID: **2** Type: **Poster Presentation**

Graphene/TiO2 as electron transport layer to enhance energy efficiency of perovskite solar cells

Tuesday, 4 July 2023 15:40 (1 minute)

In the field of the energy transition, developing efficient and cost-effective solar cells is a crucial goal to establish an optimal energy mix. The third generation of photovoltaic cells, which utilize abundant materials and simple processes, has emerged to achieve this goal. Among these, photovoltaic cells based on perovskite materials have demonstrated significant advances, with power conversion efficiencies reaching up to 22%. However, efforts are still needed to improve these cells' charge generation and collection. One strategy to achieve this is using TiO2/graphene nanocomposites, which have been shown to reduce recombination phenomena and improve electron collection. The technique of laser pyrolysis is used to achieve high-quality nanocomposites with suitable properties for efficient and stable solar cells. This technique enables the synthesis of nanoparticles in a single step with a continuous flow. Tests were conducted using a MAPI-Cl perovskite deposited in a single-step, and the results show an increase in electron injection efficiency and device performance with the use of graphene in the mesoporous TiO2 layer. Overall, the use of this technique resulted in an increase in power conversion efficiency from 14.1% to 15.1% for these devices, demonstrating the benefit of the laser pyrolysis process for the production of high-quality electron transport layers in perovskite solar cells.

Apply to be considered for a student ; award (Yes / No)?

No

Level for award;(Hons, MSc, PhD, N/A)?

N/A

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Session Classification: Poster Session 1

Track Classification: Track A - Physics of Condensed Matter and Materials