NANO seminars

ICN2 Institut Català de Nanociència i Nanotecnologia

EXCELENCIA SEVERO OCHOA

Nano in Chemistry & Materials

Printed perovskite solar cells and modules on flexible substrates and their integration with energy storage systems

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Abstract

Flexible perovskite solar cells (f-PSCs) have recently reached power conversion efficiency (PCE) as high as 20.7%. Although still lagging behind their rigid counterparts on glass, which in very short time have achieved 25.7% of certified efficiency, the use of flexible substrates opens up to a wide range of applications, from sensors for the Internet of Things, to the retrofitting of existing buildings to improve their energy efficiency (building-applied PV), to space, thanks above all to the high power/to weight ratio generated which is the range of 29.4 W/g compared to 8.31 W/g for amorphous silicon and 0.254 W/g for ultra-thin CdS / CdTe.

For IoT applications, the integration of f-PSCs with flexible storage system is required to overcome the discontinuous illumination. In literature, the integration of the two devices has been demonstrated only on rigid substrates, with a maximum operating voltage of 0,84 V when the supecap is charged by a single solar cell.

In this presentation, the fabrication of flexible perovskite devices will be reported focussing in particular on the role of the scaling up of the realization process from solar cells to module which allowed the FPSMs to deliver 12% PCE and negligible hysteresis on 16.8 cm^2 and 11.7% PCE on 21.8 cm^2 active area.

Printed supercapacitors realized with environmentally friendly with will be presented both with a vertical and planar architecture which achieved a maximum specific power density above 20 $\mu W\ cm^{-2}$. A possible strategy for the integration of the two devices will be also shown highlighting the critical issues in the final assembly of the two systems.

Thursday 13 October at 3PM (CET)
ICN2 Seminar Room - https://icn2.cat/en/events

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