

# Solar driven multifunctional windows and third generation of solar cells

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Energy efficiency in buildings has attracted significant interest recently, since the building sector contributes by 30% to the total energy consumption and is responsible for the production of 25% of the total greenhouse gases emitted. The energy consumption of buildings is mainly due to their users' needs for heating, cooling, and lighting, while buildings exchange large amounts of heat with their surroundings through windows.

Electrochromic (EC) smart windows are energy saving devices, that change their appearance upon applying an external potential. Their energy saving advantages have been demonstrated, even against the best thermal insulating windows. As a result, the use of EC smart windows could result in the reduction of the total annual energy consumption up to 40%. However, they have not achieved a wide market penetration so far, especially due to their high cost and their need for an external power supply. Thus, for EC smart windows to make substantial improvements in their cost-to-performance ratio, lower cost manufacturing methods must be adopted, or novel features and new functionalities must be added, raising the IQ of smart windows

To this goal, solar driven multifunctional window, that combines energy storage and the electrochromic functionality into one device powered simultaneously by the sun, have been developed. Integrated dye sensitized and perovskite solar cells have been used to power the electrochromic part of the device. Their working principle and the recent developments in the field will be presented.



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