Photovoltaics

VNIVERSITAT DE VALÈNCIA

Production of photoelectric material layers with perovskite-type structure

R+D result

Patent

Knowledge Area

- Solar Photovoltaics
- Molecular Chemistry
- Optoelectronics

Collaboration

- Technology available for licensing
- Other collaborations

Ref. OTRI
201440R-Bolink, H.

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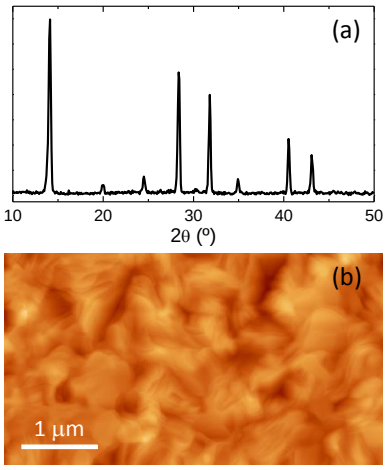
Background: Optoelectronic devices such as solar cells are devices that convert light into electricity. In recent years some organic-inorganic hybrid materials with perovskite-type structure have attracted great interest as photovoltaic materials. Perovskite is placed as a thin layer on a metallic foil using different solution deposition techniques. Currently, simultaneous co-evaporation techniques have been proposed to produce relatively flat and homogeneous perovskite layers. However, this process is relatively time-consuming and it requires accurate periodical calibration to control proper deposition rate and precursors ratio. Equally, the deposition by single source thermal ablation (SSTA) obtains optically active and polycrystalline thin films. However, layers produced by SSTA are usually too rough to be incorporated into optoelectronic devices.
Thus, there is still a need to find a production method of thin layers of perovskite for opto-electronic applications whereby layers of homogeneous perovskite, with layer thickness between 50 and 500 nm, with a uniform surface and high crystallinity are obtained. This layer thickness is necessary for their use in photovoltaic devices so that they have high sunlight absorption without hindering the charge transport.

The invention: Researchers from the Universitat de València have developed a **new method for the production of photoelectric material layers with perovskite-type structure** that solves the problems of roughness and thickness of the layers obtained by the up-to-date described methods. The developed method allows the production of optoelectronic devices with layers which are exceptionally smooth and thicker than the described ones and the continuous and highly reproducible construction of devices. Furthermore, the obtained devices show worthy properties for their use as solar cells since homogeneous perovskite films with large crystal size allow increasing the thickness of the layer, hence increasing sunlight absorption without hindering the charge transport.

Applications: The invention is applicable in optoelectronic devices manufacturing such as solar cells, transistors and OLEDs.

Advantages: The method of the invention has the following advantages:

- Production of multilayer structures of different organic-inorganic materials is possible.
- It is simple and rapid, so lower production costs and faster device fabrication is feasible.
- It allows tandem preparation of solar cells.



(a) GIXRD pattern and (b) AFM topography of a CH3NH3PbI3 thin film deposited by the method

Related technologies: Inverted Solar Cell for thin film 3rd generation photovoltaics (Ref. OTRI: 201338R-Bolink, H.)

OTRI oficina de transferència de resultats d'investigació

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