Functional Molecules and Materials

Plasmonic Nanostructures for Reducing Spectral Losses of Solar Cells

[application areas]

Solar cells, sensors, optical components.

[year of invention] 2013.

[authors]

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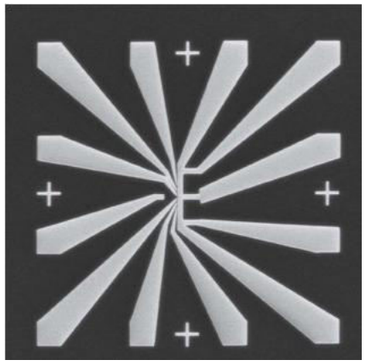
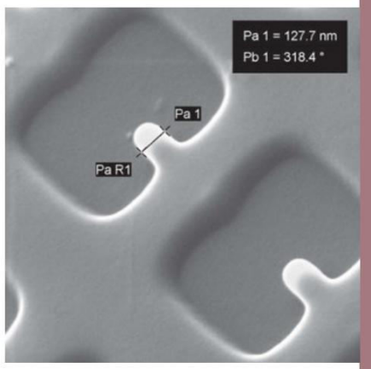
[features, technical specifications]

The project aims to form, research and apply plasmonic nanostruc¬tures to increase the effectiveness of photoconversion of energy photons with a band gap smaller than that of a semiconductor. Thin films of diamond like carbon based nanocompontes with silver and copper nanoparticles (DLC:Me) were tested. Systematic studies of plasmonic properties Raman scattering, photoelectrical properties were performed for the DLC:Me thus deposited by reactive magnetron sputterring (direct current, high ionization pulsed magnetron sputterring modes) of metalic target in hidrocarbon and argon atmosphere. An examination of the photovol¬taic properties of DTAD:Ag/Si and DTAD:Cu/Si heterojunctions showed that short-circuit current can be controlled choosing the post annealing temporative, UV irradiation or conductivity of silicom substrate was achieved by exposing the sample to an IR LED, while the lowest – by an UV LED or, in some cases, a green LED.





[novelty]

A study of the relationship between the optical properties of DTAD:Ag and DTAD:Cu films, and the structure and chemical composition of the coatings has been completed. The photovoltaic properties of the films have been examined and it was shown that the photovoltaic effect in these films is mainly related to the excitation of plasmon photoelectrons in metal nanoclusters.

[technological readiness level]

A product model. The project is scheduled until 30/09/2015.

[what are we looking for in this stage of development?]

Funding for further research and completion of the prototype; R&D orders related to the invention; partners from scientific institutions for joint research.

[patenting]

Patentability analysis required.

[commercialisation]

The project is still in progress. Optimisation works are ongoing.

[alternatives] None.

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