



A New Material for Improved Energy Transfer in Photonic Devices

Tech ID: 31830 / UC Case 2016-429-0

BACKGROUND

Hybrid materials composed of semiconductor nanocrystals functionalized with acene ligands have recently emerged as a promising platform for controlling the flow of energy from photons. This material has numerous potential applications including the ability to increase solar cell efficiency, produce visible radiation, and improve photocatalytic efficiency. To fully realize this scheme, energy transfer between nanocrystals and acenes must occur with high efficiency.

BRIEF DESCRIPTION

Prof. Ming Lee Tang and her colleagues from the University of California, Riverside have developed a promising new material for photonic devices utilizing hybrid materials composed of inorganic semiconductor nanocrystals and organic acene molecules. The material allows for photon upconversion, a promising wavelength shifting technology for photon management. This multi-photon process has potential applications in biological imaging, photocatalysis and photovoltaics.

Regarding solar energy systems, the conversion of low energy near-infrared (NIR) photons to higher energy photons is particularly appealing, considering NIR radiation comprises 53% of the solar spectrum. Current solar panels are greatly limited in efficiency due to this. Reshaping the solar spectrum to match the optical properties of common semiconductors will allow the efficient use of all incident light. This holds the potential to solve the largest issue that current solar panel systems face.

APPLICATIONS

- ▶ To drastically improve solar cell efficiency by utilization of near infrared light
- ▶ To innovate and improve light based devices like photodetectors, photocatalysts, or for bioimaging

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,351,580	07/16/2019	2016-429

RELATED MATERIALS

- ▶ [Semiconductor Nanocrystal Light Absorbers for Photon Upconversion. J. Phys. Chem. Lett. 2018, 9, 21, 6198-6206 - 10/11/2018](#)

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OTHER INFORMATION

KEYWORDS

photon upconversion quantum yields, semiconductor quantum dots, acenes, triplet excitons, nanocrystals, solar panels

CATEGORIZED AS

- ▶ [Energy](#)
- ▶ [Solar](#)
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