

## 3<sup>rd</sup> International Conference and Exhibition on **Lasers, Optics & Photonics**

September 01-03, 2015 Valencia, Spain

### Dye-sensitized solar cells using ethynyl-linked porphyrin trimers for NIR photoelectric conversion

Tomofumi Hamamura<sup>1,2</sup>, Jotaro Nakazaki<sup>2</sup>, Satoshi Uchida<sup>2</sup>, Takaya Kubo<sup>2</sup> and Hiroshi Segawa<sup>2</sup>

<sup>1</sup>University of Bordeaux, France

<sup>2</sup>The University of Tokyo, Japan

Dye-sensitized solar cells (DSSCs) have widely attracted much attention as promising candidates for low-cost next-generation solar cells. For the improvement of the power conversion efficiency of DSSCs, it is important to utilize near-infrared (NIR) light and to induce efficient charge-separation at the interface between dyes and TiO<sub>2</sub>. The charge-separation process is known to be affected by the adsorption geometry of dyes on the TiO<sub>2</sub> surface. In this study, we focused on ethynyl-linked porphyrin trimers as NIR-light harvesting dyes, and investigated the effect of the adsorption geometry of the trimers on the photovoltaic properties of the DSSCs. Some trimers which are different in the number and position of anchoring groups were synthesized for controlling their adsorption geometry. Photo-anodes were prepared by immersing TiO<sub>2</sub> electrodes into DMF solution of these compounds containing deoxycholic acid as co-adsorbent. The difference in the number of anchoring groups drastically changed the adsorbed amount of the trimers on the TiO<sub>2</sub> surface. On the other hand, the difference in the position of anchoring groups was found to affect not only the adsorbed amount of the trimers, but also charge-separation efficiency. Among these compounds, the trimer with anchoring groups in the long-axial direction showed the highest IPCE value in NIR region (47% at 840 nm). In this talk, we will discuss the difference in the photovoltaic properties of the DSSCs using these compounds in detail.

#### Biography

Tomofumi Hamamura was a Research Fellow of the Japan Society for the Promotion of Science (JSPS) from 2011-2013. He received a PhD degree from The University of Tokyo in 2014. In April 2014, he became a Post-doctoral fellow at The University of Tokyo. In September 2014, he joined the research group of University of Bordeaux as a visiting researcher of LIA-Next PV project between French institutes and The University of Tokyo. His current interests include the development of large  $\pi$ -conjugated organic molecules for organic electronics.

[tomo431984@gmail.com](mailto:tomo431984@gmail.com)

#### Notes: