Technology from Kyoto University

Organic Compound-Based Photocatalysts for Enhanced Photon Utilization Efficiency

We are looking to out-license the technology for its commercialization.

Development of photocatalysts with efficient charge transfer via optimized design of multiple organic polymers and metal complexes

◆Background

Developing high-performance solar energy conversion systems is a critical challenge for addressing global energy issues and promoting carbon resource recycling. The development of highly efficient photocatalysts is key to achieving this goal. To date, research on photocatalysts utilizing expensive noble metals has advanced in terms of efficiency, yielding certain achievements. On the other hand, from the perspective of resource sustainability, organic compound-based photocatalysts have attracted attention; however, they have not demonstrated sufficient performance to date.

◆Description

Kyoto University researchers divided the photocatalyst into four components—donor, spacer, acceptor, and metal complex catalyst - and optimized the selection, combination, and ratio of organic polymers and metal complexes suitable for the target reaction. As a result, they have developed a photocatalyst with a potential gradient that enables highly efficient charge transfer. Compared to previously reported photocatalysts by the present researchers, the developed system achieved approximately 30-fold improvement in light utilization efficiency, with an external quantum efficiency (EQE) of 34.5% at 430 nm. The technology is expected to enable the development of a highly efficient solar energy conversion system that reduces resource risks by minimizing excessive reliance on noble metals.

- Reduced use of precious metals by using a photocatalyst composed of organic polymers and metal complexes
- Advantages in cost and scalability for mass production, as the technology can utilize commercially available organic polymers
- Adaptability to a wide range of applications beyond CO_2 reduction and water splitting, enabled by the molecular design of metal complexes and organic compounds

◆Development Status

- Currently evaluating photocatalysts suited to different applications.

◆Applications

- CO_2 reduction
- Water splitting

◆Offer

- Collaborative Research
- Patent License*
- Option for Patent License*

*Field-specific exclusivity available upon request

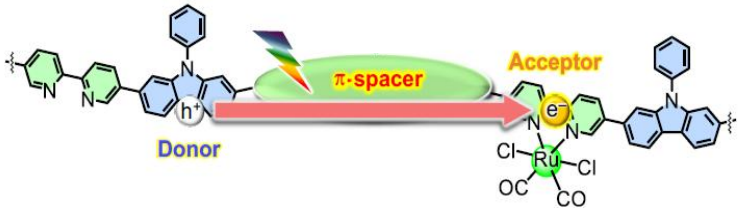

Fig.1 Example of the photocatalyst configuration consisting of the four components in this technology

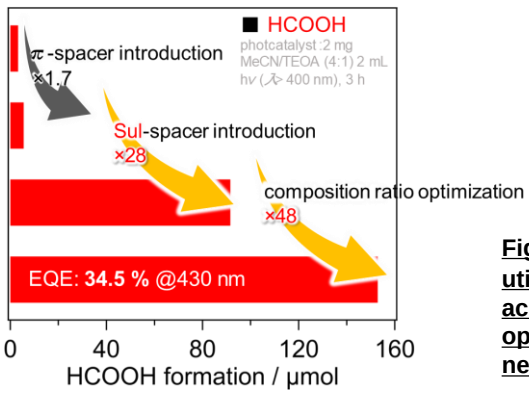

Fig.2 Enhanced light utilization efficiency achieved through design optimization using the new method.

◆Contact

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IAC Institutional Advancement and Communications

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