# Demonstration of the Potential of Organic Nanocrystals as Visible-Light Active Photocatalyst

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In recent years, organic semiconductor materials have obtained much interest in the field of energy, and have been explored for various applications, including solar cells, fuel cells and rechargeable lithium batteries, mainly because of low-cost facile synthesis, excellent electrical and electrochemical activity, high carrier mobility, and mechanical properties. In general, organic materials are cheap, and abundant, easy to process, and easy to modify[1]. The development of the organics photovoltaic is one of the good example for the use of organic semiconductor materials where organic semiconductor has been used to enable a printable, bendable, and cheaper solar panels. The ability to tune the bandgap and emission of organic molecule has made them very attractive for the light emitting diode applications as well. Despite many benefits, Organic material until now has gained only little attention as photocatalyst, compared to its inorganic counterparts. In this presentation, we will showcase our original approach employing organic nanocrystal (NCs) as a highly effective photocatalyst for water decontamination and hydrogen generation applications.

Organic NCs have been fabricated by reprecipitation method [2] resulting in a well-defined organic NCs. Especially, Polydiacetylene (PDA) NCs and [6,6]-Phenyl $C_{61}$ butyric acid methyl ester (PCBM) NCs have been demonstrated as a superior photocatalyst for the photodegradation reaction of an organic dye even when compared with the traditional $TiO_2$ (Fig. 1). Furthermore, we investigated the relationship between the photocatalytic activity and the morphology of NCs. Recent experiments have indicated good recyclability of PDA NCs as well as the great thermal stability. We confirmed that these material can be used repeatedly without losing their performance over up to 10 cycles. Our finding could help advance the development of photocatalysis using organic material and so on in the near future.

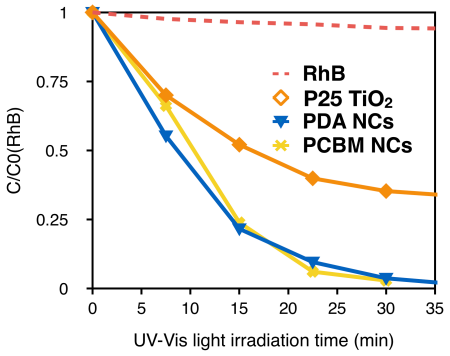


**Fig. 1** Comparative photocatalytic activity of PDA NCs, PCMU NCs, and $TiO_2$ under UV-Vis irradiations for the degradation of Rhodamine B.

[REFERENCES]

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