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A recent development of mixed metal oxides/polymer nanocomposites as energy storage catalysts

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Titanium dioxide (TiO_2) is a promising material for versatile applications, i.e., air-water purification, anti-fogging, anti-corrosion. However, those applications are limited to the available of the appropriate light source. To overcome this problem, modification with energy storage substances such as WO_3 [1], Phosphotungstic acid [2] and TiO_2-V_2O_5 [3] is applied. An energy storage system is composed of electron generating source (i.e., TiO_2) and energy storage substance. The mechanism of energy storage in the air states that TiO_2 generates photo-excited electrons under UV light and those electrons transfer to energy storage substance. Those stored electrons release and carry on the cathodic reactions in the dark as shown in Fig. 1. The energy storage system can be used as multipurpose materials for many aspects i.e. anti-corrosion, pollutant decomposition, coating substances for smart window. The photo catalytic electron can subsidize the electron deficiency that metal lose to the environment [3], while coincident hydroxyl radical, which is a product from water oxidation by photo-excited holes can decompose the pollutant [4]. However, the efficiency of the system is relied on the contact between TiO_2 and an energy storage substance. The use of conduction polymer to bridge the electron generating source and the energy storage substance has proved to be effective and overcome the aforementioned problem [4]. In this presentation, we demonstrate the use of the hybrid materials as energy storage catalysts. The photocatalytic oxidations of toluene in a gas phase and methylene blue are given as examples.

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