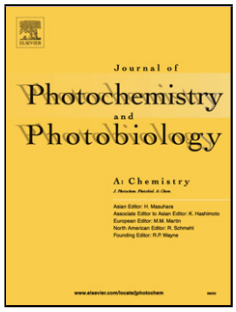

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Characterization of Dispersed Titania Nanosheet under Aqueous Conditions and its Complex Formation Behavior with Cationic Porphyrin

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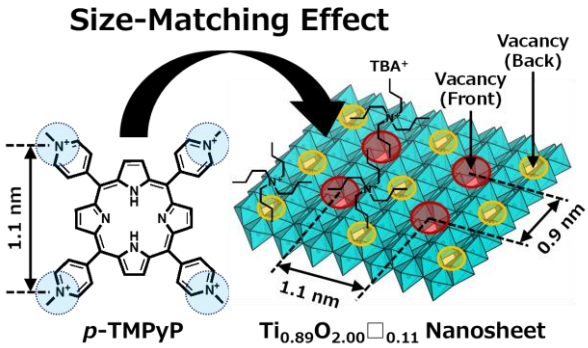
Graphical Abstract



"The image of TNS/p-TMPyP complex formation

Highlights

- Cation exchange capacity (CEC) of titania nanosheet (TNS) was determined to be is 1.5×10^{-3} eq g^{-1}.
- The complex formation behavior of TNS with the cationic porphyrin were investigated.
- The maximum adsorption ratio of the cationic porphyrin onto dispersed TNS surface was almost 100% versus CEC in aqueous conditions under the optimum conditions.

Abstract
Cation exchange capacity (CEC) of titania nanosheet (TNS) and the complex formation behavior with the cationic porphyrin were investigated. It is turned out that the CEC value of TNS is 1.5×10^{-3} eq g^{-1} according to a thermogravimetric analysis. The maximum adsorption ratio of the cationic porphyrin onto dispersed TNS surface was almost 100% versus CEC in aqueous conditions under the optimized concentration of the exfoliating reagent. This result indicates that cationic porphyrins adsorb densely without molecular aggregation.

Keywords: Inorganic/organic complexPorphyrin Titania nanosheet Size-matching effect Cation exchange capacity

1. Introduction

Natural leaves realize the excellent photochemical conversion called photosynthesis. Photosynthesis is the reaction which can convert solar energy into chemical energy and accumulate energies as chemicals. In natural leaves, various dyes exist and each of them have different absorption bands to utilize sunlight effectively. Furthermore, they transfer and concentrate absorbed light energy to the reaction center [1-6]. This efficient energy transfer occurs by the regular arrangement of dyes around and within proteins in general [7].