IT-002

Thermodynamic Control in Competitive Anchoring of N719 Sensitizer on Nanocrystalline TiO_2 for Improving Photoinduced Electrons

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The process of charge transfer at the interface between two semiconductors or between a metal and a semiconductor plays an important role in many areas of technology. The optimization of such devices requires a good theoretical description of the interfaces involved. This, in turn, has motivated detailed mechanistic studies of interfacial charge-transfer reactions at metal/organic, organic/organic, and organic/inorganic semiconductor heterojunctions. Charge recombination of photo-induced electron with redox species such as oxidized dyes or triiodide or cationic HTM (hole transporting materials) at the heterogeneous interface of TiO_2 is one of main loss factors in liquid junction DSSCs or solid-state DSSCs, respectively. Among the attempts to prevent recombination reactions such as insulating thin layer and lithium ions-doped hole transport materials and introduction of co-adsorbents, although co-adsorbents retard the recombination reactions as hydrophobic energy barriers, little attention has been focused on the anchoring processes. Molecular engineering of heterogeneous interfaces by employing several co-adsorbents with different properties altered the surface properties of TiO_2 electrodes, resulting to the improved power conversion efficiency and long-term stability of the DSSCs. In this talk, advantages of the coadsorbent-assisted sensitization of N719 in preparation of DSSCs will be discussed.

Keywords: Charge transfer, Interface, Competitive anchoring, Thermodynamic control

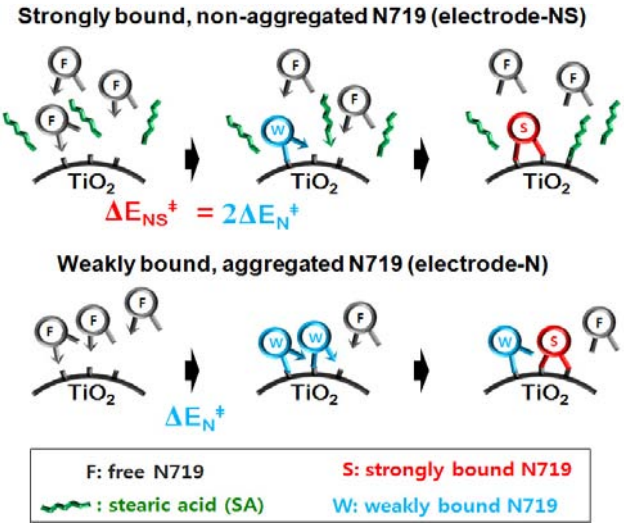

Fig. 1. Plausible competitive anchoring processes of N719 dyes in the presence (electrode-NS) and absence (electrode-N) of coadsorbent (stearic acid) on the surface of nanocrystalline TiO_2 electrodes.

References

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