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Block Copolymer Nano-Structured Materials

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Poster presented at *The Search for a Sustainable Energy Future: Challenges for Basic Research*, A Mini-Symposium sponsored by the Energy Working Group at Penn, March 9, 2007.

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Block Copolymer Nano-Structured Materials

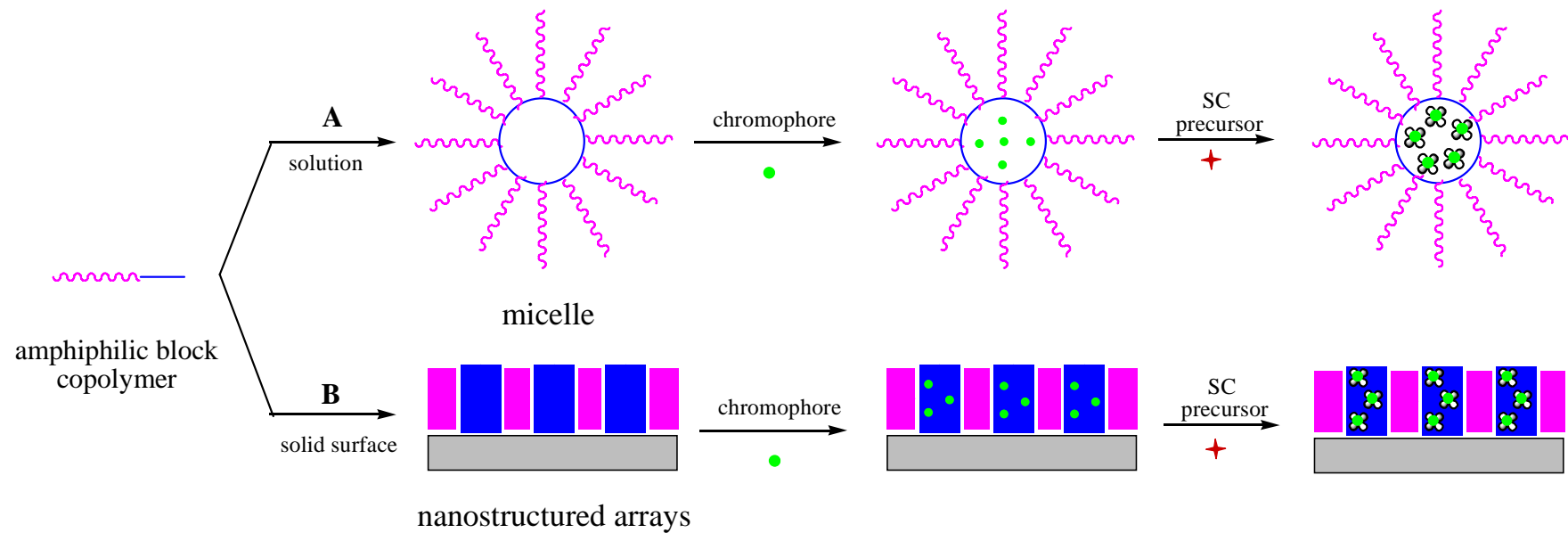
Comments

Poster presented at *The Search for a Sustainable Energy Future: Challenges for Basic Research*, A Mini-Symposium sponsored by the Energy Working Group at Penn, March 9, 2007.

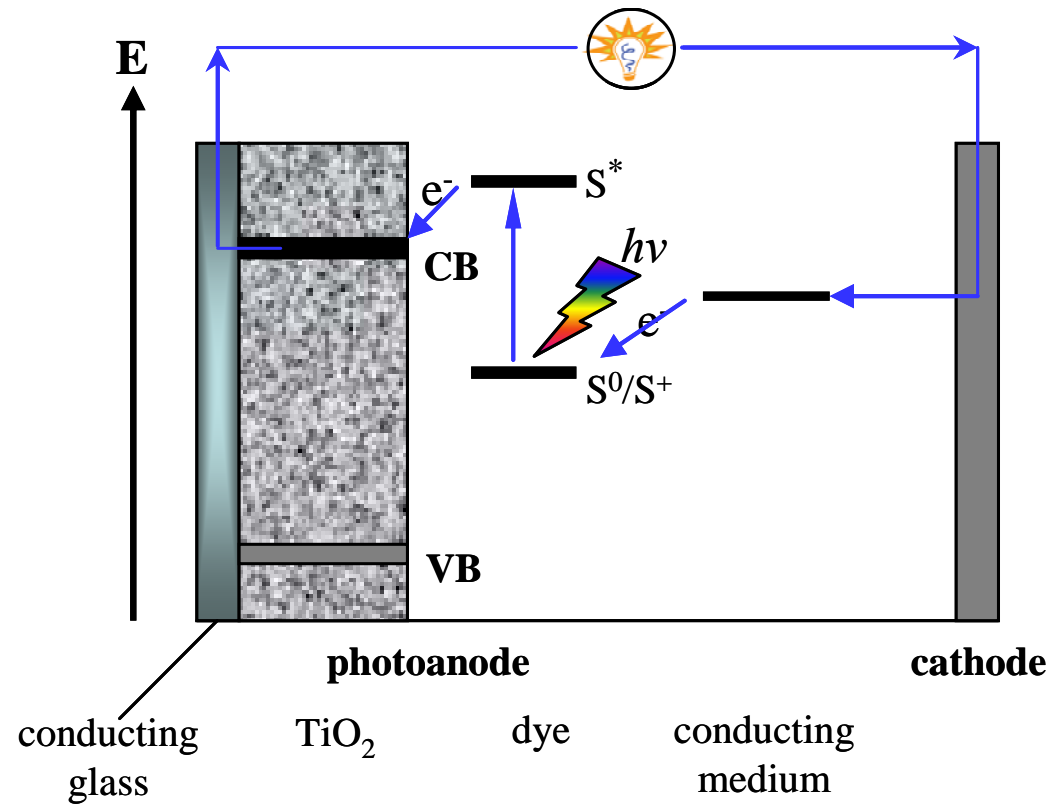
Block Copolymer Nano-Structured Materials

Michael Fryd and Bradford B. Wayland

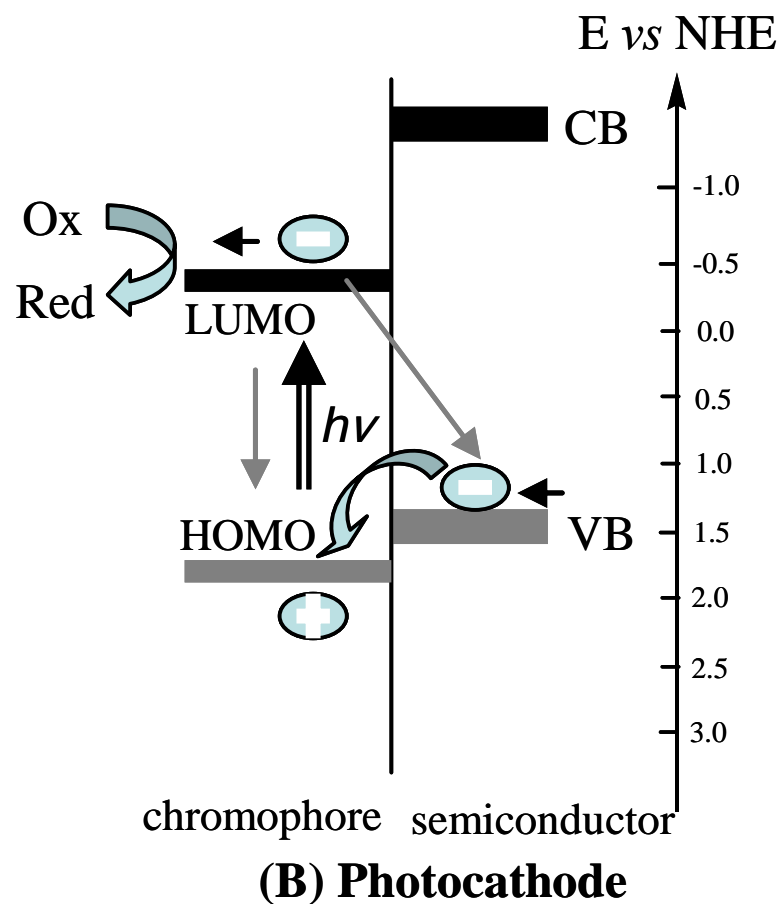
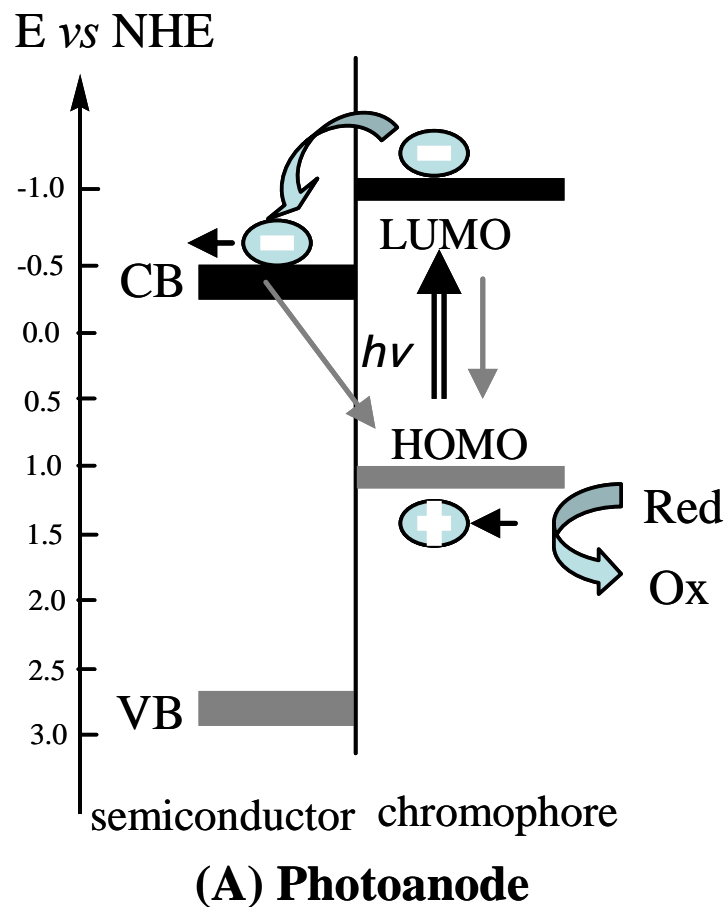
Block Copolymers as Nanoscale Reactors to Form Semiconductor Composite Materials



Schematic Dye Sensitized Solar Cell (DSC)



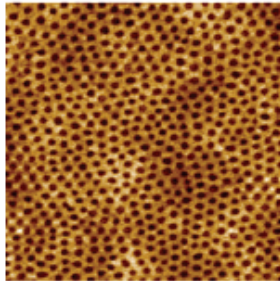
Chromophore Sensitized Photoanode(A) and Photocathode(B)



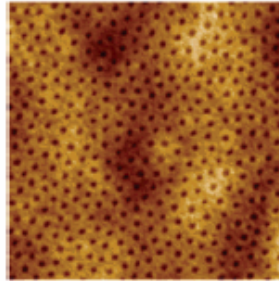
Nanostructures of PS-*b*-PAA Films

R. J. Composto, C. Xu

(a) pH 2.6



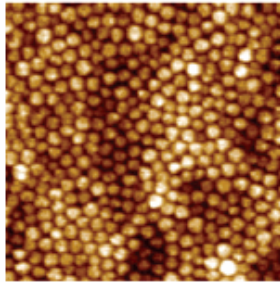
(b) pH 3.1



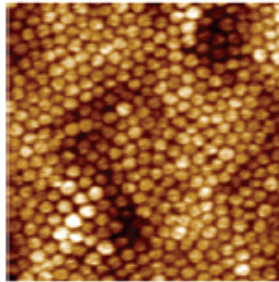
(c) pH < 4.0



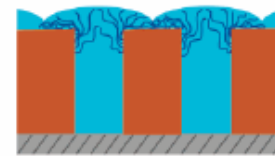
(d) pH 4.6



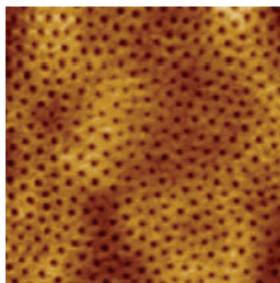
(e) pH 5.7



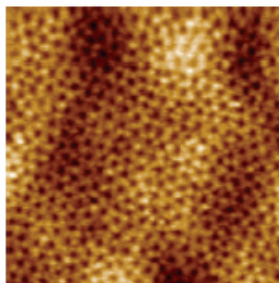
(f) 4.0 < pH < 6.0



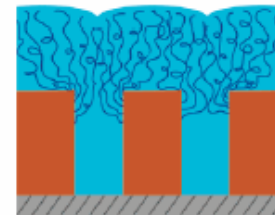
(g) pH 6.3



(h) pH 8.0

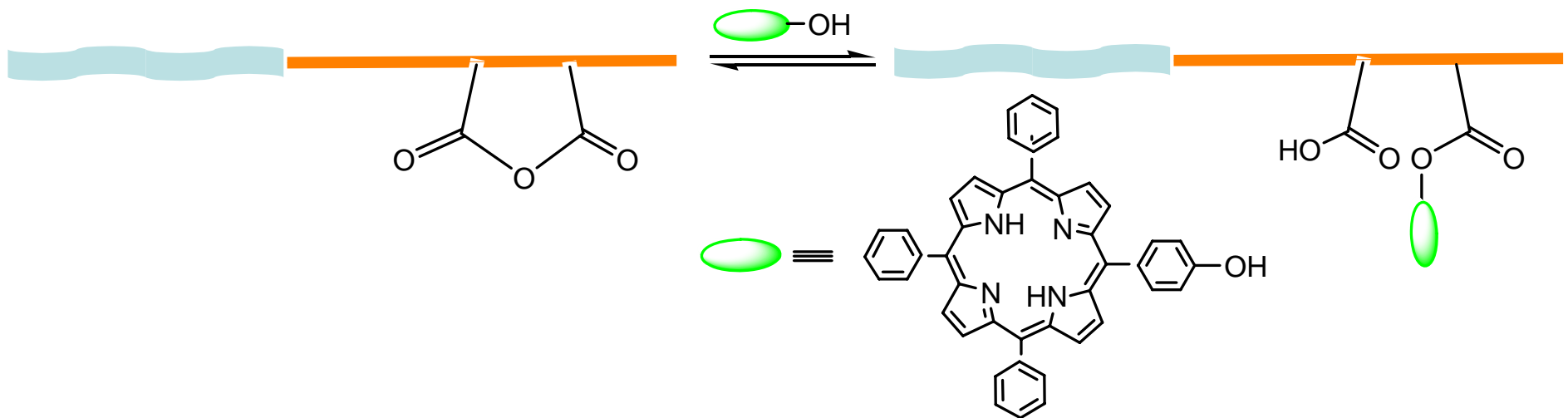


(i) pH > 6.0



Porphyrin Chromophore Covalently Linked to the Hydrophilic Block of PS-*b*-P(Sty/MANH)

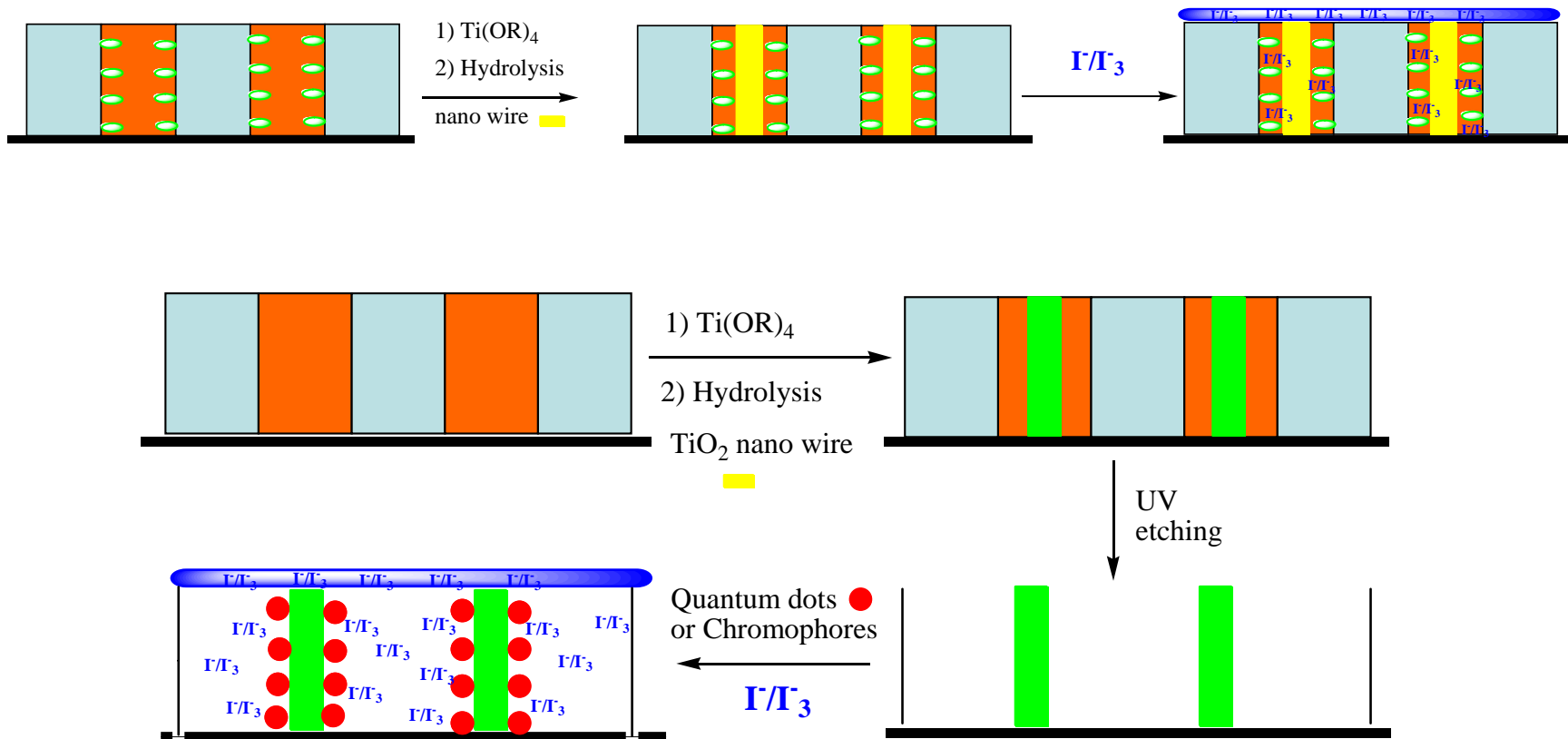
Xuefeng Fu



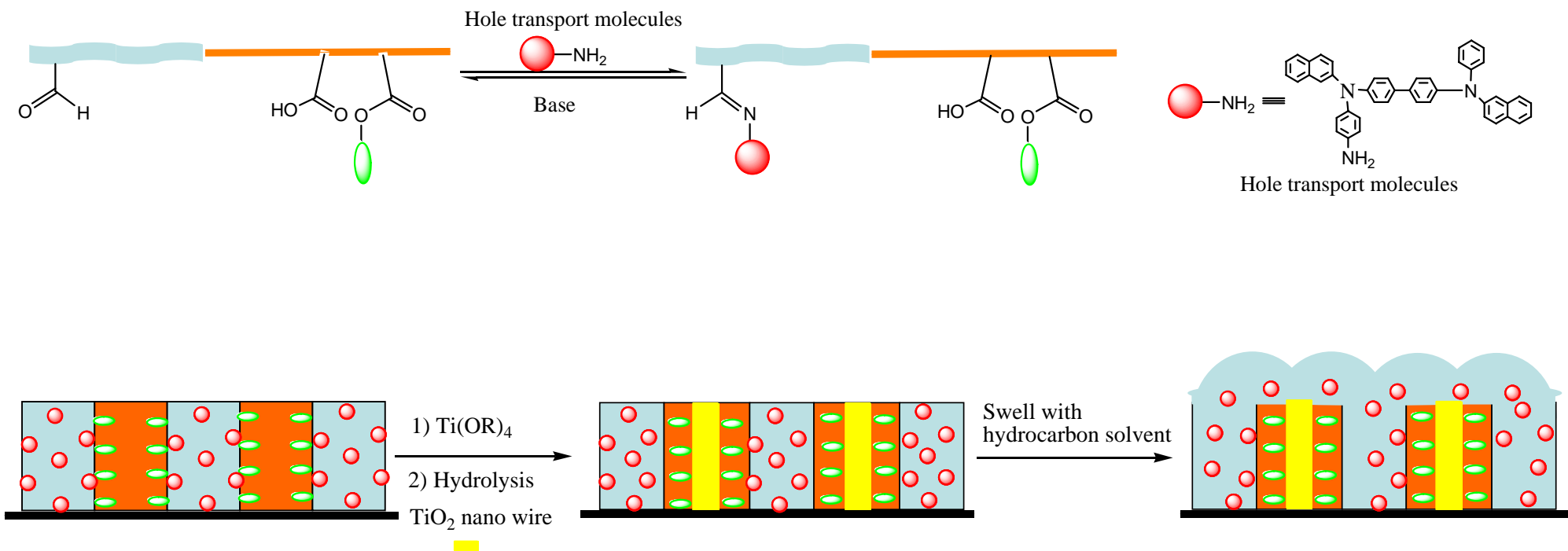
Modified DSC Type Cell

Wayland, Fryd, Dai, Park, Fischer

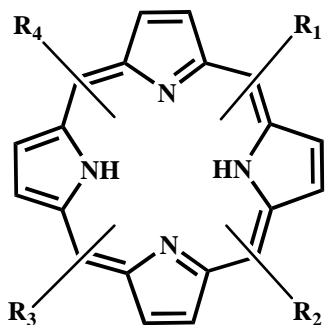
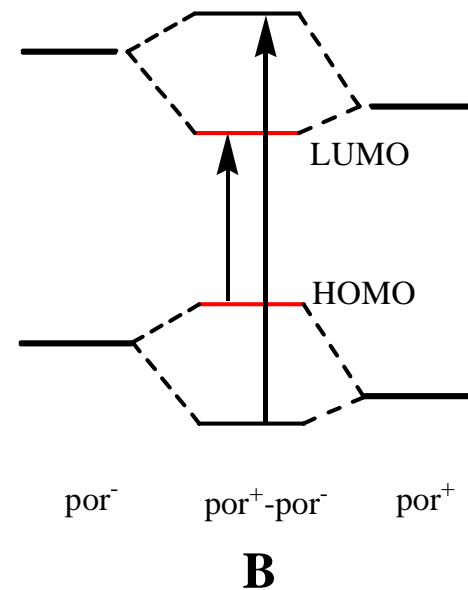
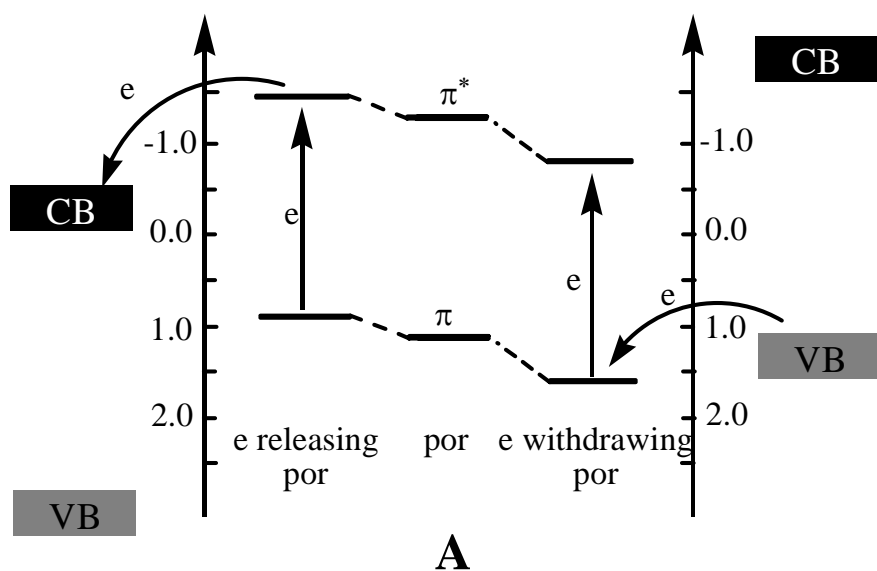
Photosensitized mesoporous semiconductor: with and without polymeric template



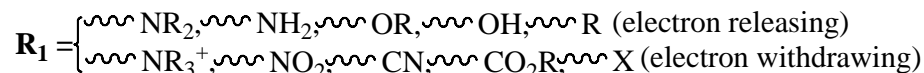
A Solid State Cell Formed by Self Assembly of Amphiphilic Block Copolymers in Thin Films



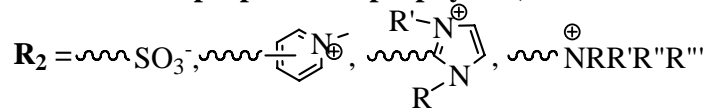
Tuning the Photosensitizer Energy Levels



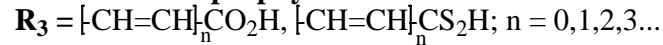
R₁ -- Provide systematical tuning of the energy levels:



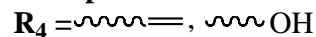
R₂ -- Provide ionic properties to porphyrin (for self assembly and water solubility)



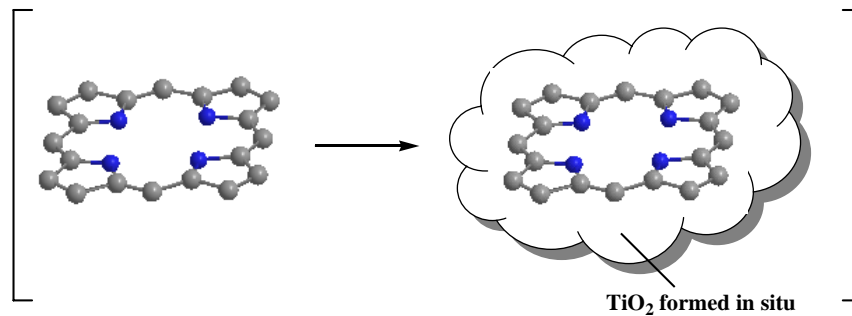
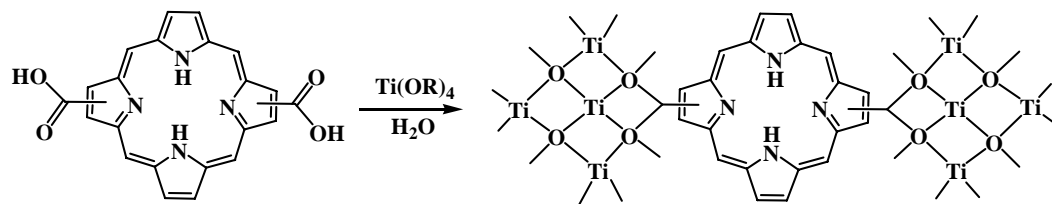
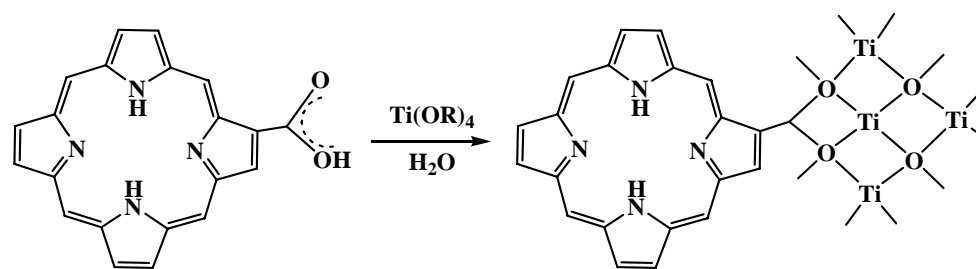
R₃ -- Attachment of porphyrin to the semiconductor:



R₄ -- Incorporation or attachment of porphyrin to polymer:

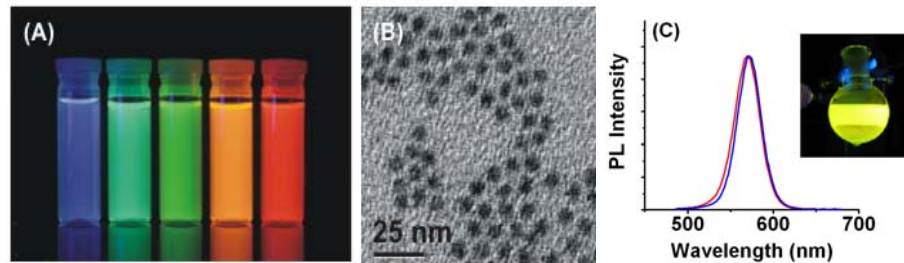
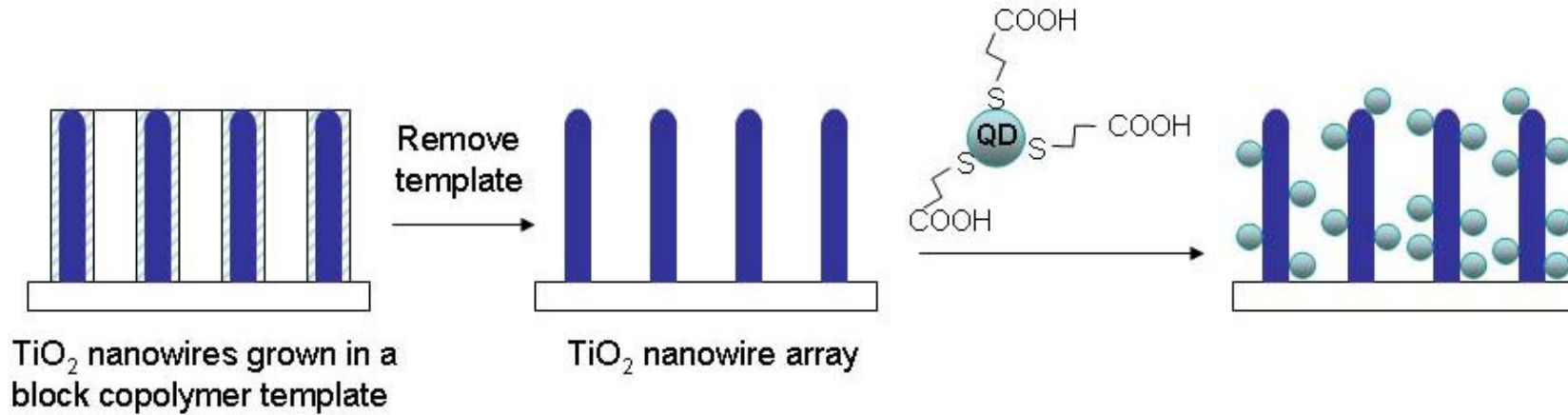


Photosensitizer – Semiconductor Interfaces



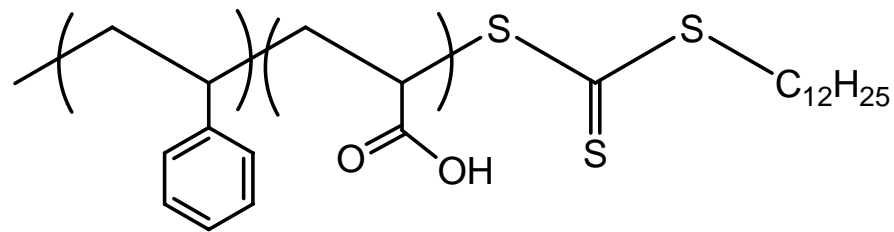
Quantum Dot Photosensitized Semiconductors

So-Jung Park

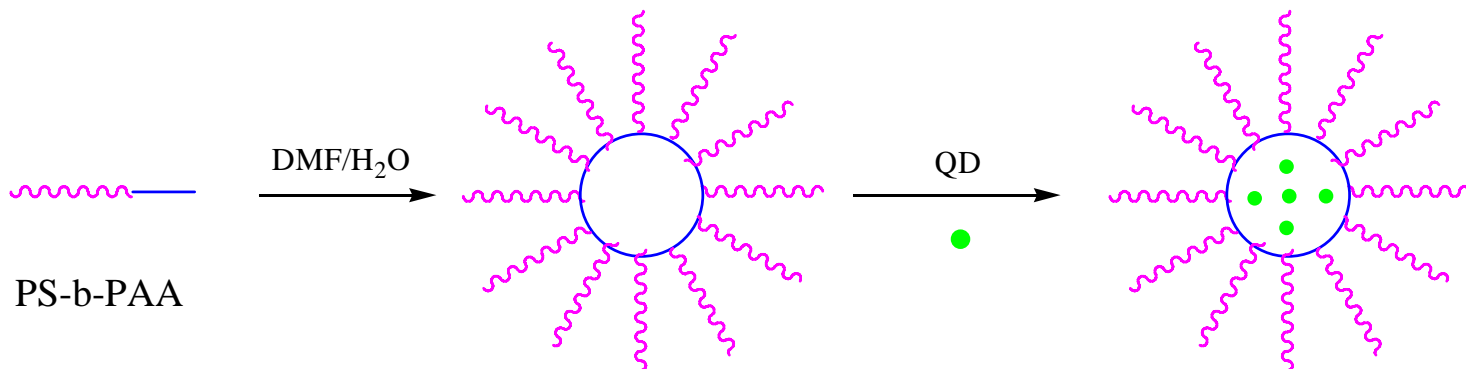


Encapsulation of Quantum Dots by Block Copolymer Nanostructures

Brenda S. Gaytan, So-Jung Park, Weihong Cui

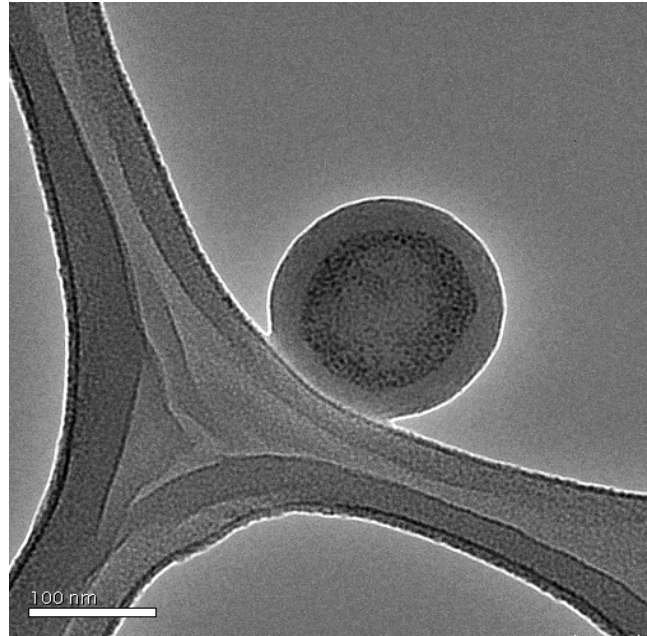
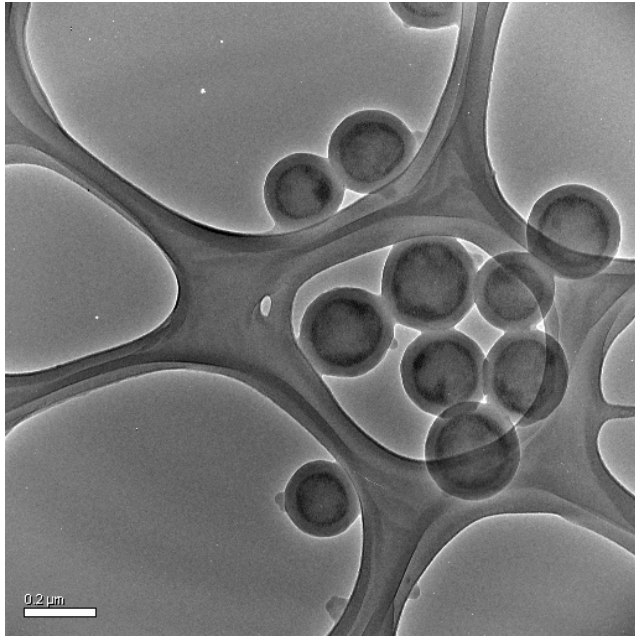


PS-*b*-PAA



PS-*b*-PAA

- TEM images of the stabilized QDs



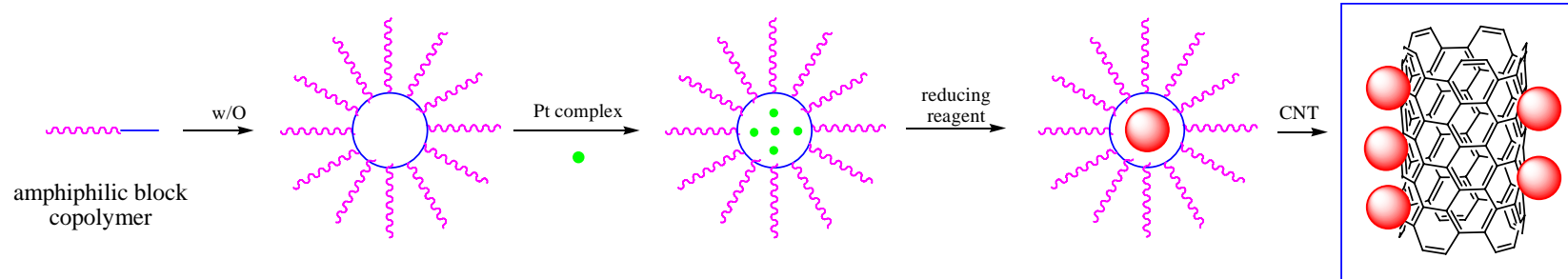
- Fluorescence of the stabilized QDs



Fabrication of Pt Nanoparticles for PEFC

Weihong Cui

- Schematic illustration of the Pt nanoparticle synthesis



- AFM and TEM images of the Pt particles stabilized by block copolymers

