(1) 光產氫與其機制

1) 氧硫化鋅觸媒，產氫不使用貴金屬、不使用Na_2S與Na_2SO_3等犧牲試劑。

2) 提出三維多重量子井能帶結構之觀念於奈米粉體。

3) 提出表面活性氧與其還原的氧空位於產氫動力學。

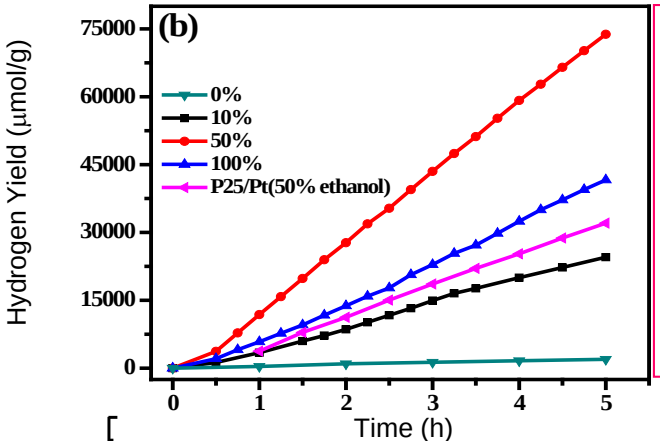
Dong-Hau Kuo

Distinguished Professor

Dept. of Materials Sci. & Eng.

Tel:+886-2-2730-3291

dhkuo@mail.ntust.edu.tw

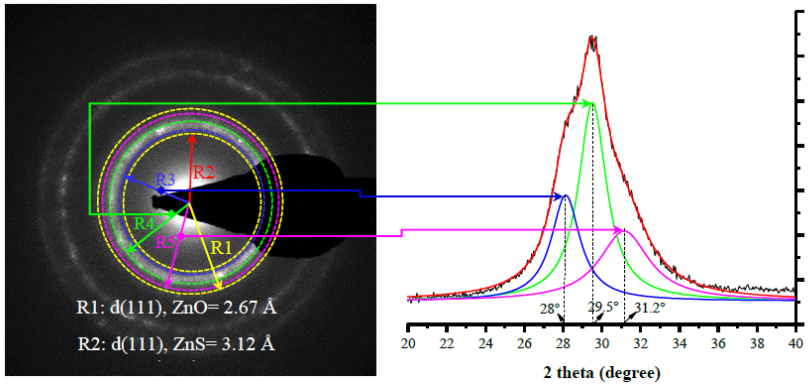


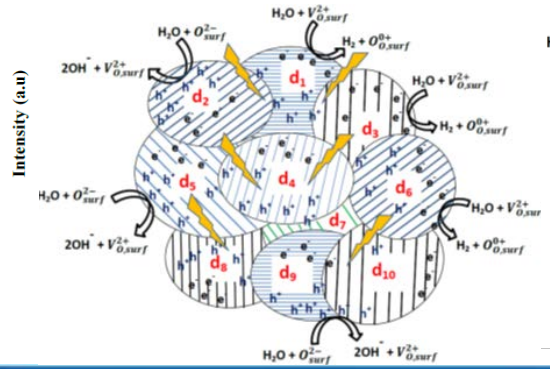
$$H_2O + O^{2-}_{surf} + 2h^+ \rightarrow 2OH^-_{aq.} + V^{2+}_{O,surf}$$

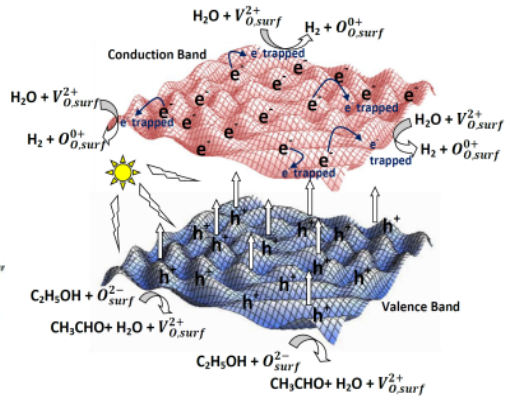
$$H_2O + V^{2+}_{O,surf} + 2e^- \rightarrow H_2 + O^{0+}_{O,surf}$$

$$H_2O + V^{2+}_{O,surf} \rightarrow 2H^+ + O^{0+}_{O,surf}$$

$$H_2O + O^{2-}_{surf} + V^{2+}_{O,surf} \rightarrow H_2 + 2O^{0+}_{O,surf}$$







(2a) 綠色光化學反應

1) 偶氮苯第一次以光反應轉化成苯胺。以往以Pt/TiO_2只能轉成二苯肼。

2) 室溫反應只有光觸媒於10%乙醇水溶液。

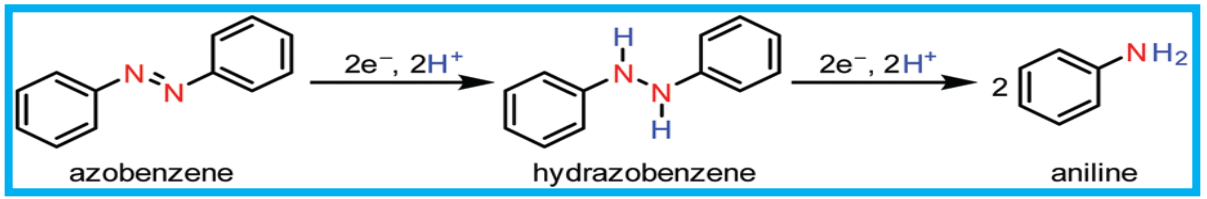
Dong-Hau Kuo

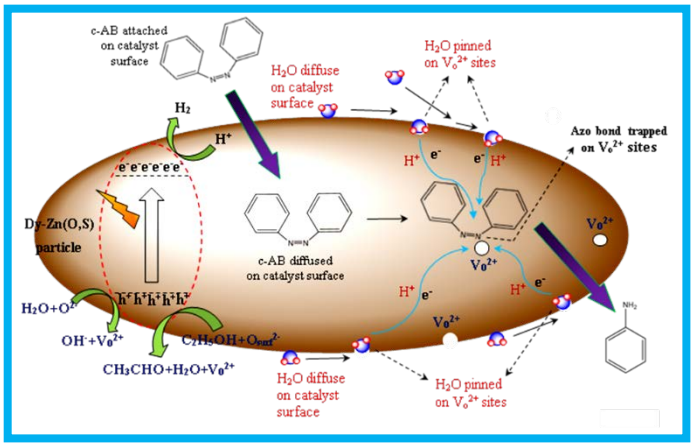
Distinguished Professor

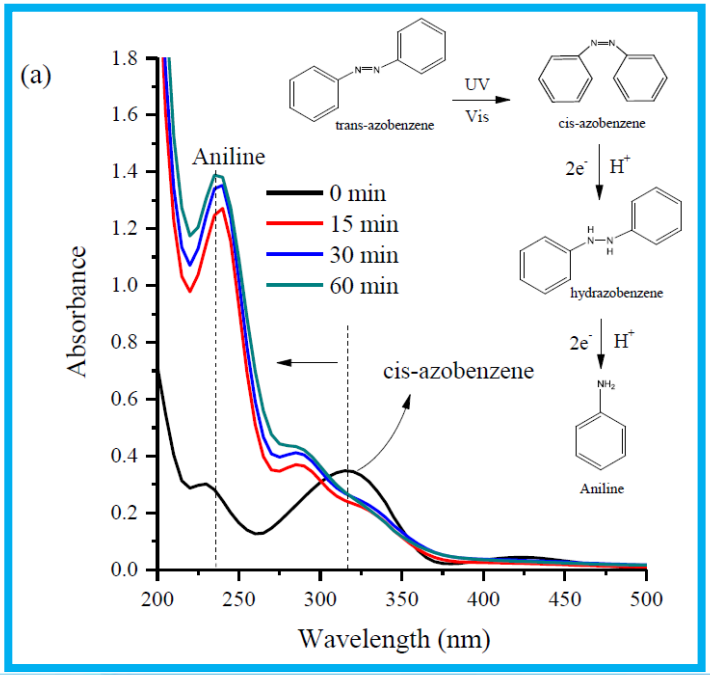
Dept. of Materials Sci. & Eng.

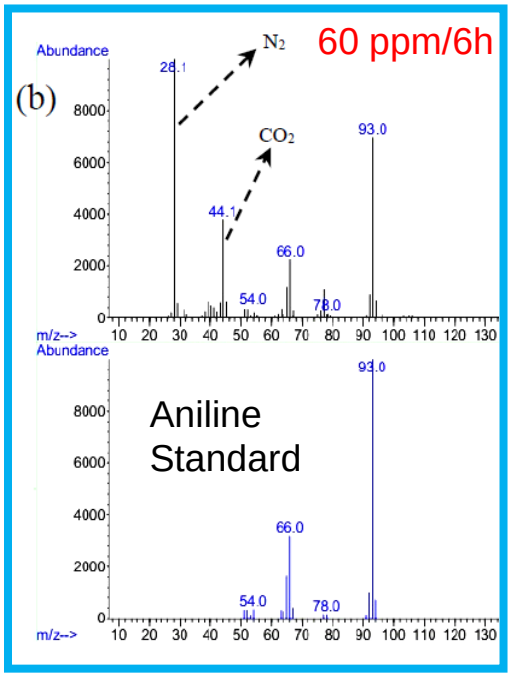
Tel:+886-2-2730-3291

dhkuo@mail.ntust.edu.tw









(2b) 綠色光化學反應

Dong-Hau Kuo

Distinguished Professor

Dept. of Materials Sci. & Eng.

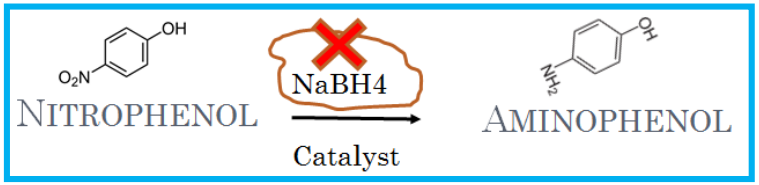
Tel:+886-2-2730-3291

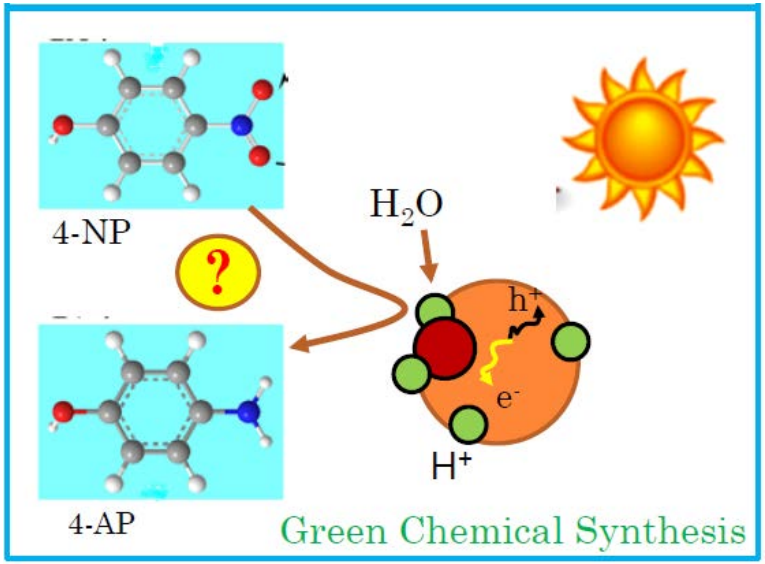
dhkuo@mail.ntust.edu.tw

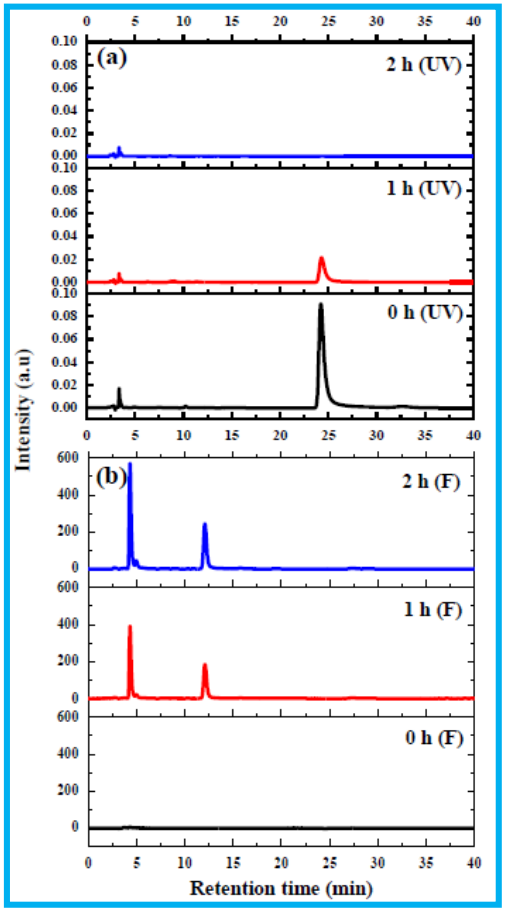
1) 硝基苯酚第一次以光反應轉化氨基苯酚。
以往光化學反應需要添加$NaBH_4$還原劑。

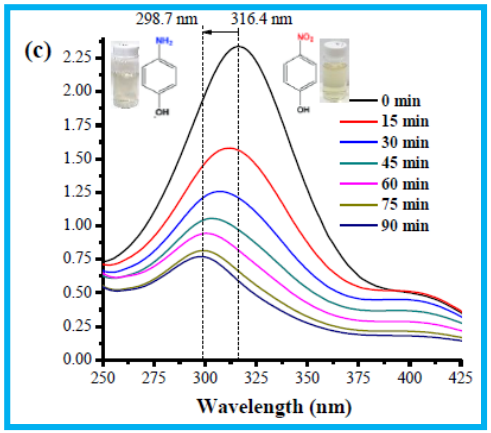
2) 室溫反應只有光觸媒於10%乙醇水溶液。

3) 減弱產氫、增強質子壽命來執行氫化反應









(3) 環境整治

1) 以摻雜改質TiO_2於太陽光下，可同時降解有害化學物種: 4-氯酚、硝基苯、苯酚；

2) 以木質素為形成奈米孔洞之模版。

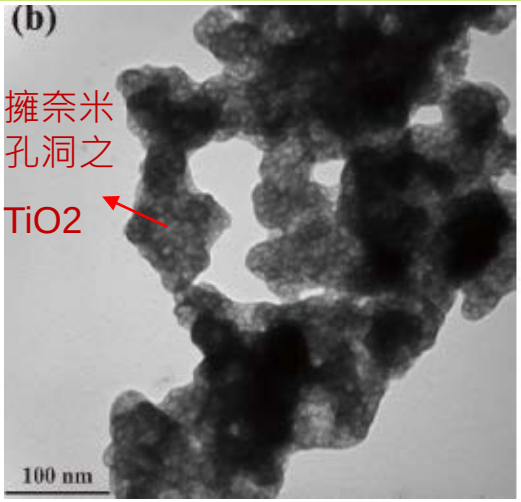
Dong-Hau Kuo

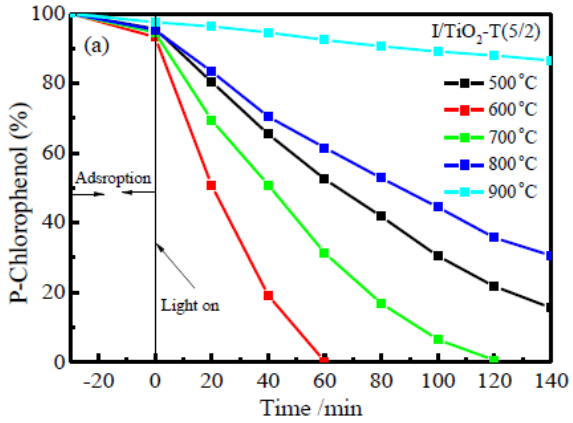
Distinguished Professor

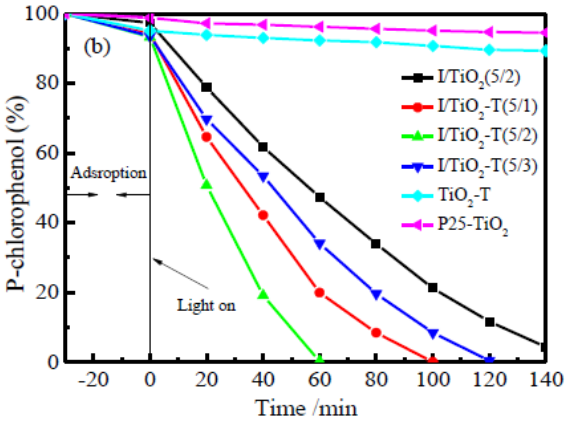
Dept. of Materials Sci. & Eng.

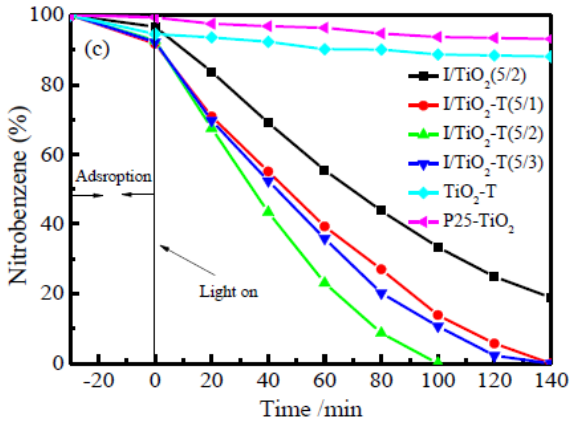
Tel:+886-2-2730-3291

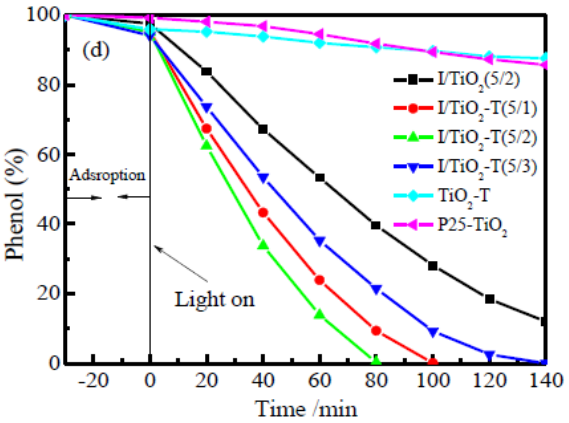
dhkuo@mail.ntust.edu.tw











(4) 高比表面積的奈米球

1) 介孔的SiO2球。
2) 比表面積達1000 m^2/g。
3) 孔洞尺寸為 2 - 8 nm。

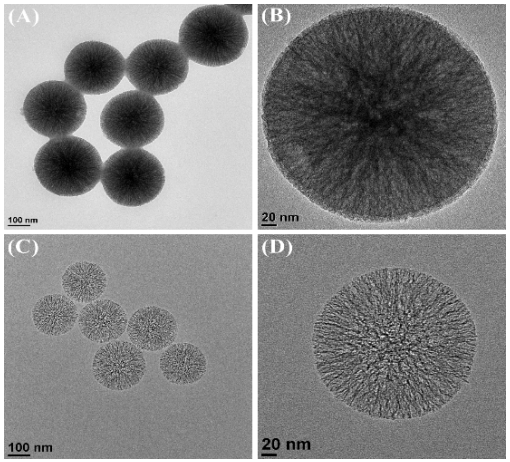
Dong-Hau Kuo

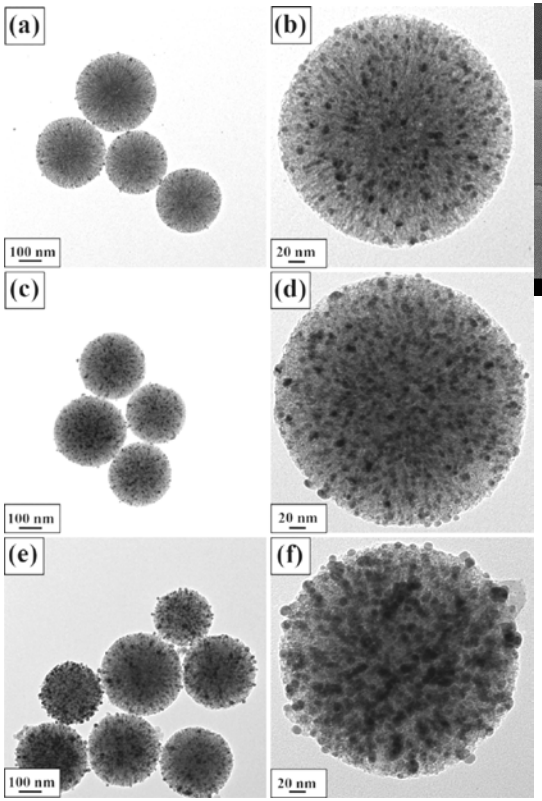
Distinguished Professor

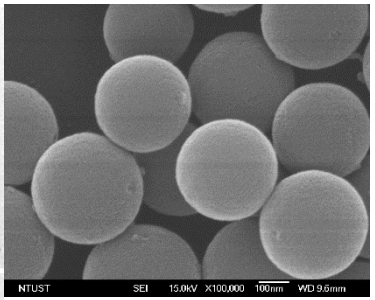
Dept. of Materials Sci. & Eng.

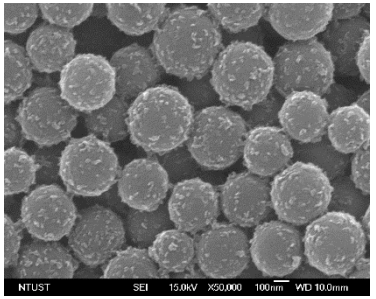
Tel:+886-2-2730-3291

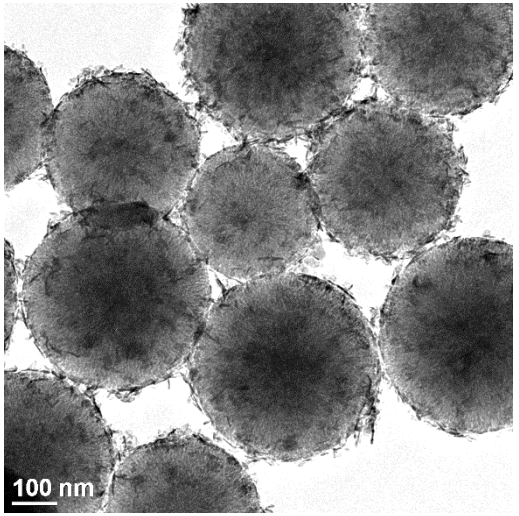
dhkuo@mail.ntust.edu.tw











(5) TiO2/Ag 奈米薄膜

Dong-Hau Kuo

Distinguished Professor

Dept. of Materials Sci. & Eng.

Tel:+886-2-2730-3291

dhkuo@mail.ntust.edu.tw

1) 80 nm 之濺鍍TiO2/Ag 奈米薄膜，可執行日光燈下殺菌。

2) 製程不同所得TiO2/Ag 不能殺菌。