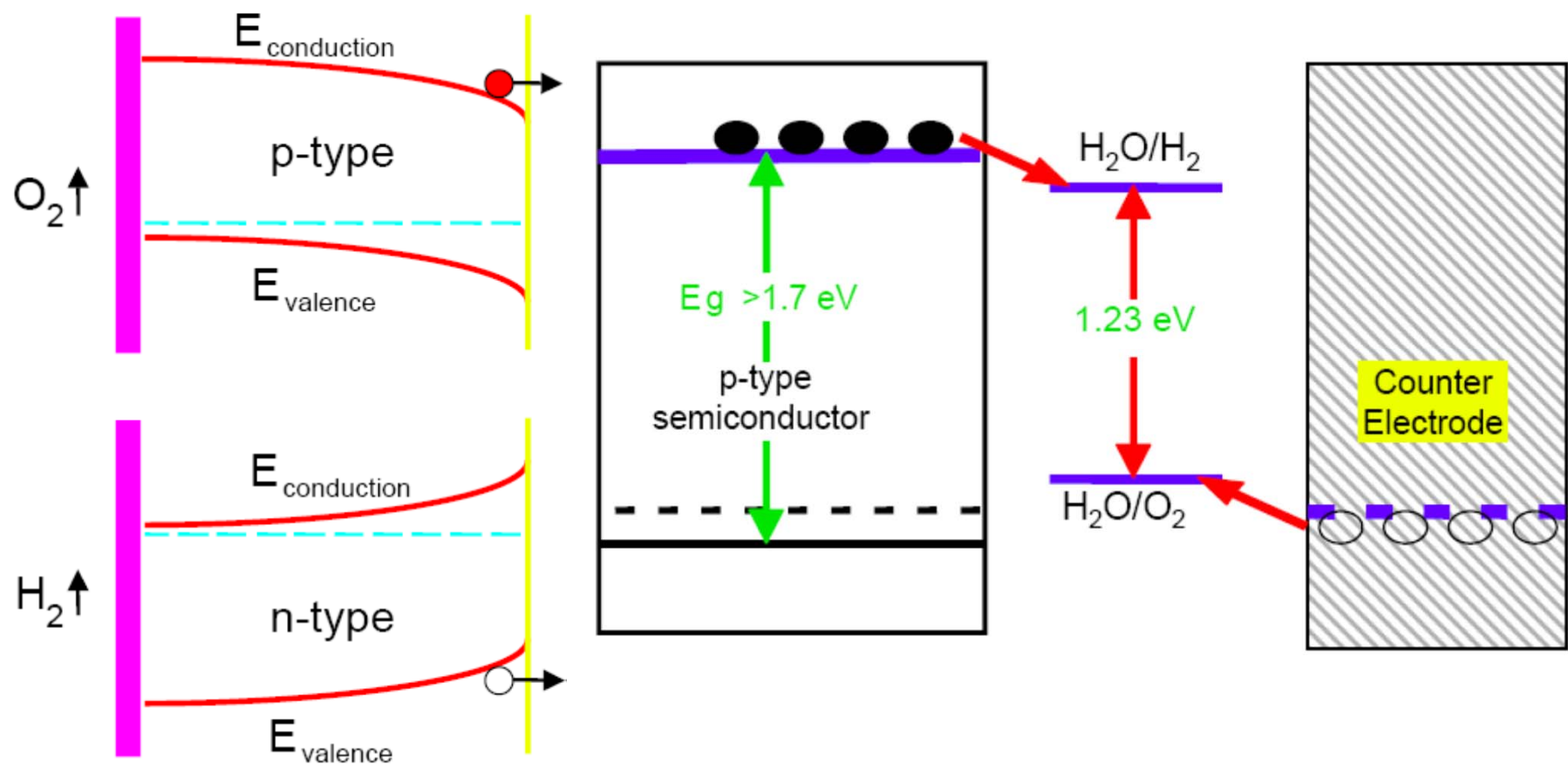


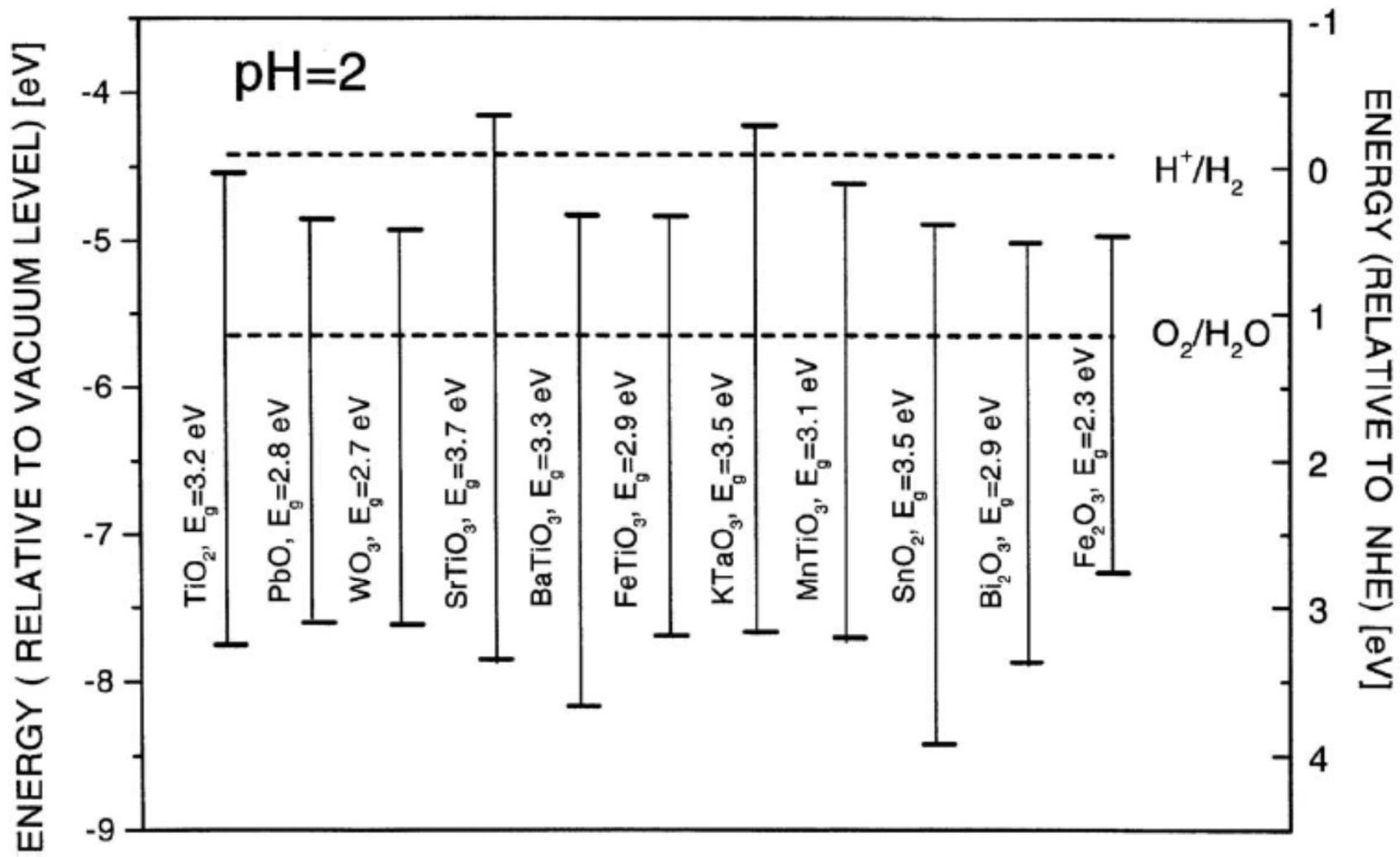
11. Фотоэлектрохимические устройства и процессы

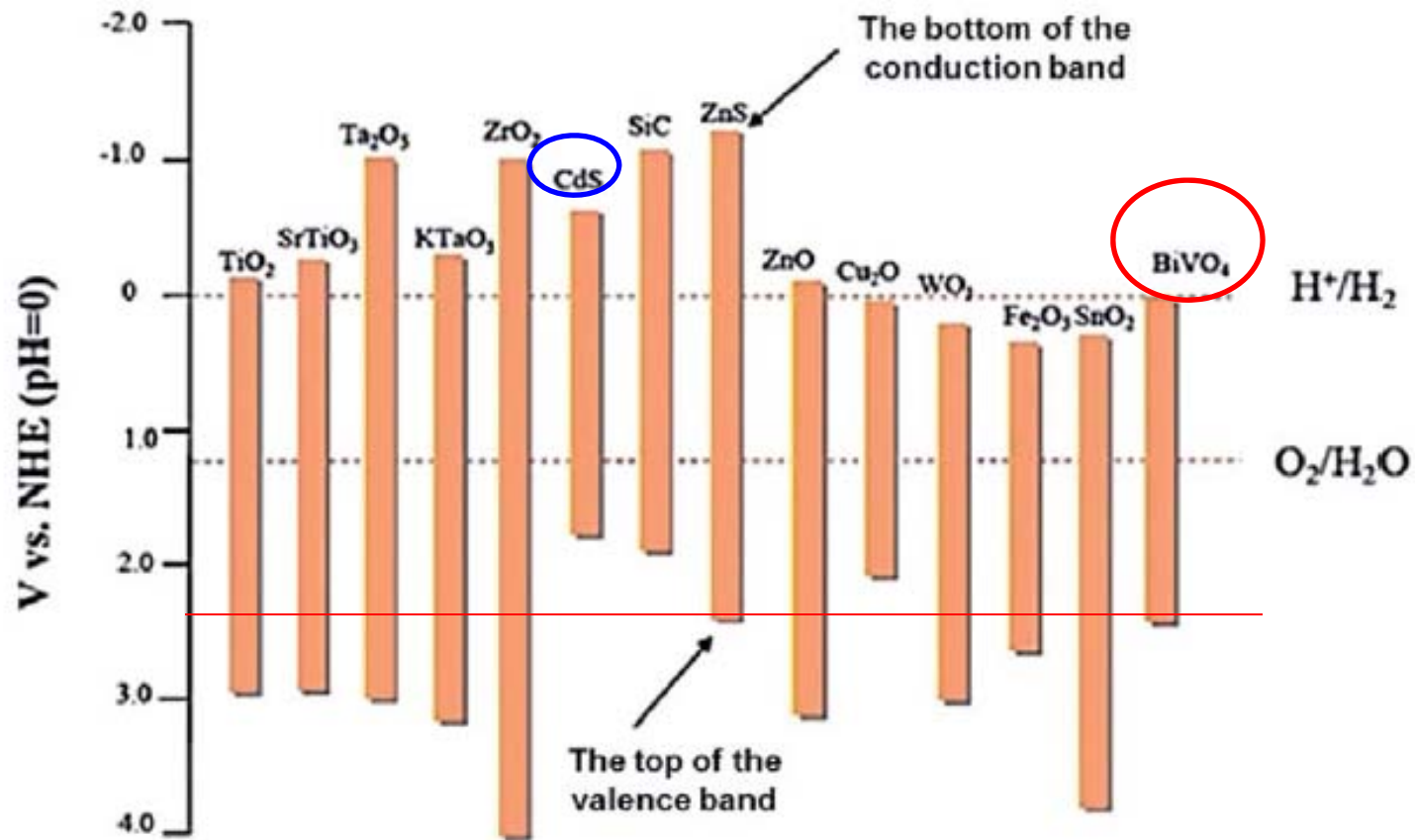
- особенности электрохимии полупроводников, фототоки
- сенсбилизация красителями
- материалы
- определение ширины запрещенной зоны
- фотоэлектрохимическое осаждение
- электроосажденные и коллоидные полупроводники

<http://www.elch.chem.msu.ru/rus/wp/index.php/kinetics/>

Фотоэлектролиз воды

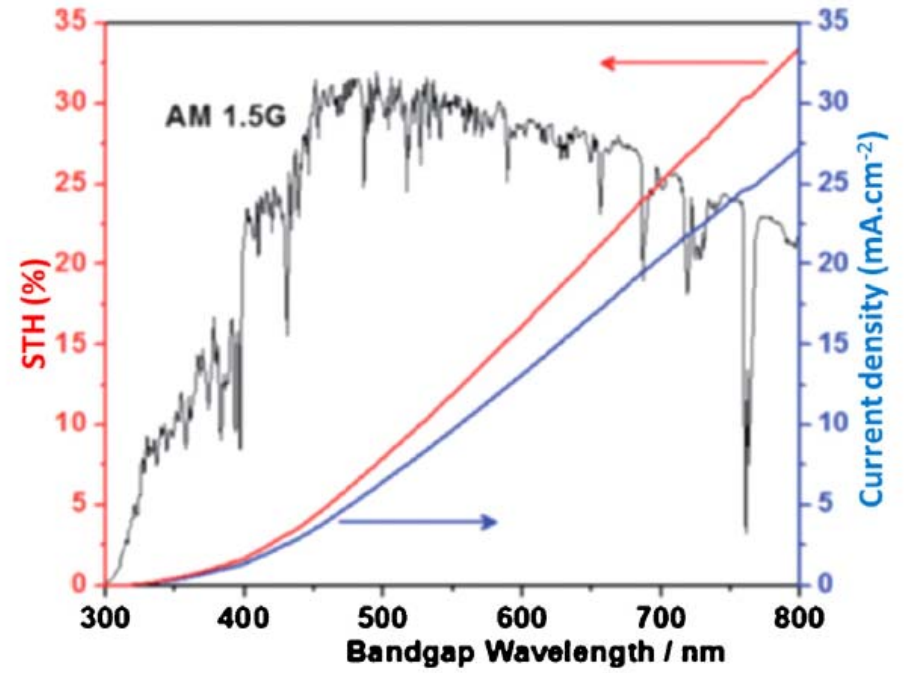
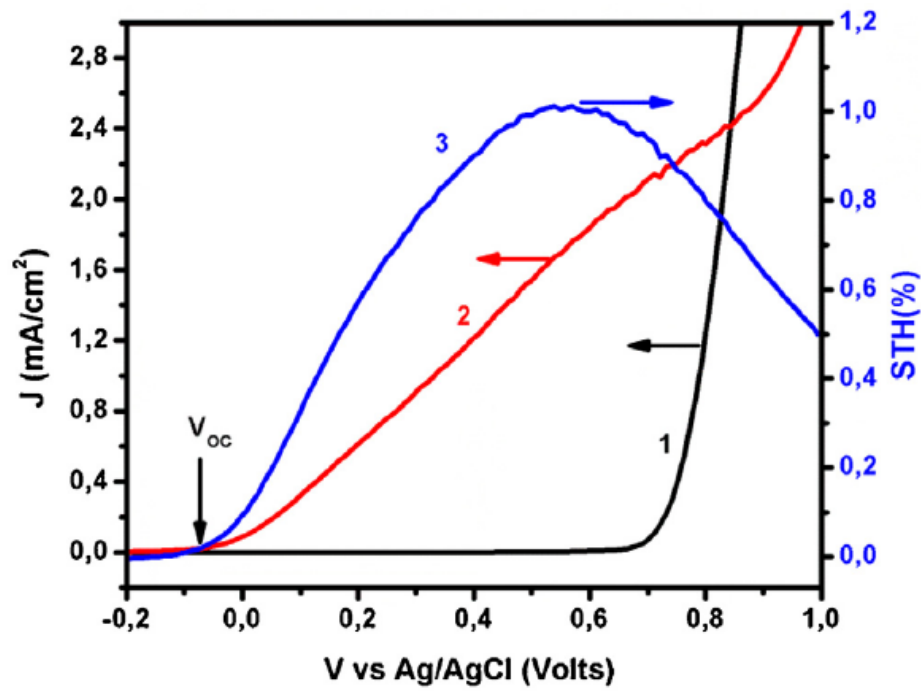




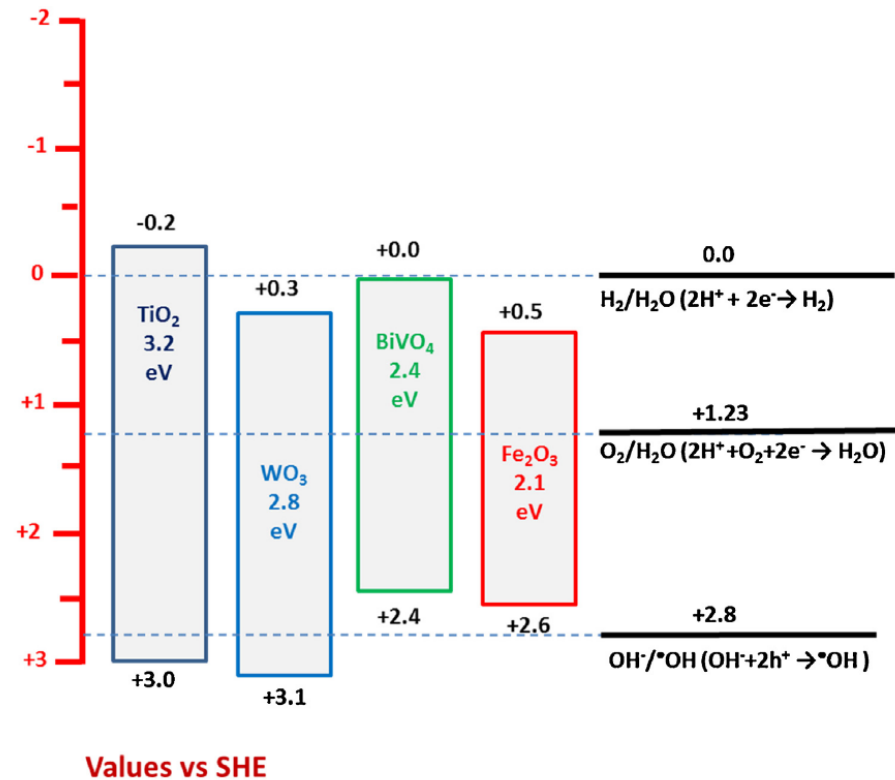
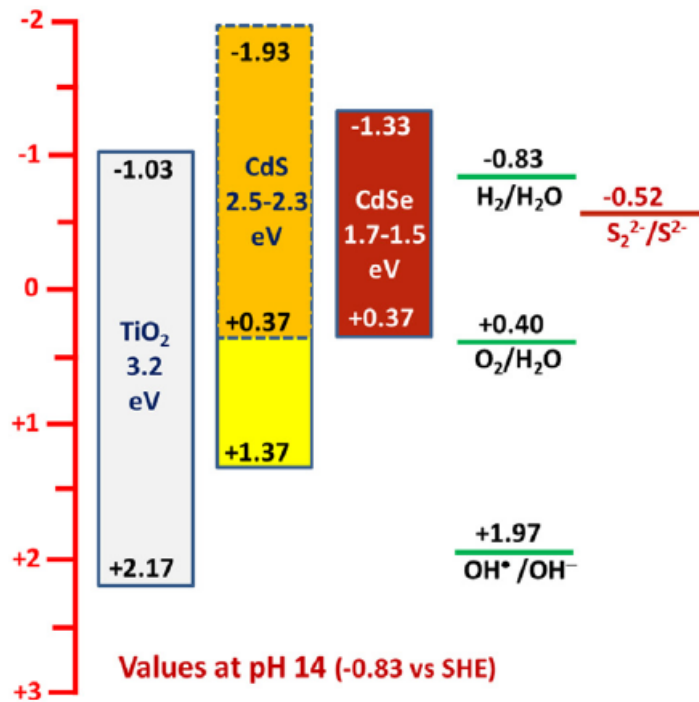
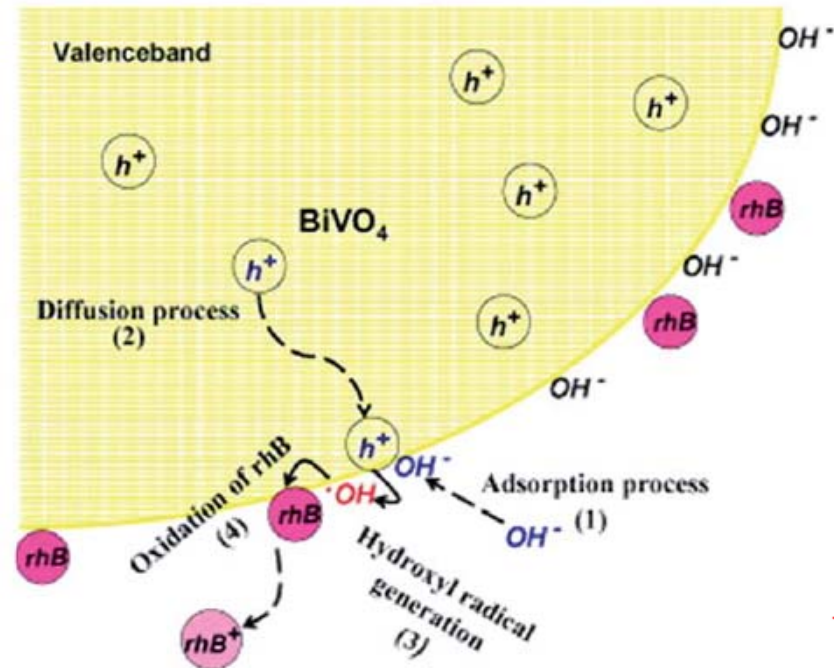


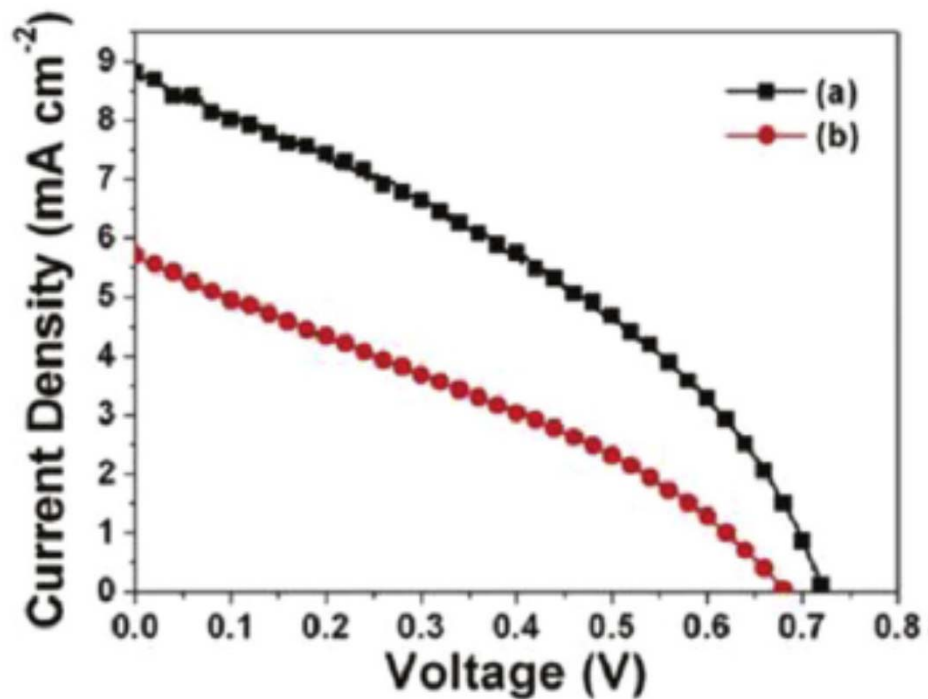
- положение краев зоны [относительно потенциалов редокс-систем]
- ширина зоны [определяет длину волны]
- стабильность в рабочих режимах
- проводимость

Solar-to-Hydrogen (STH) efficiency

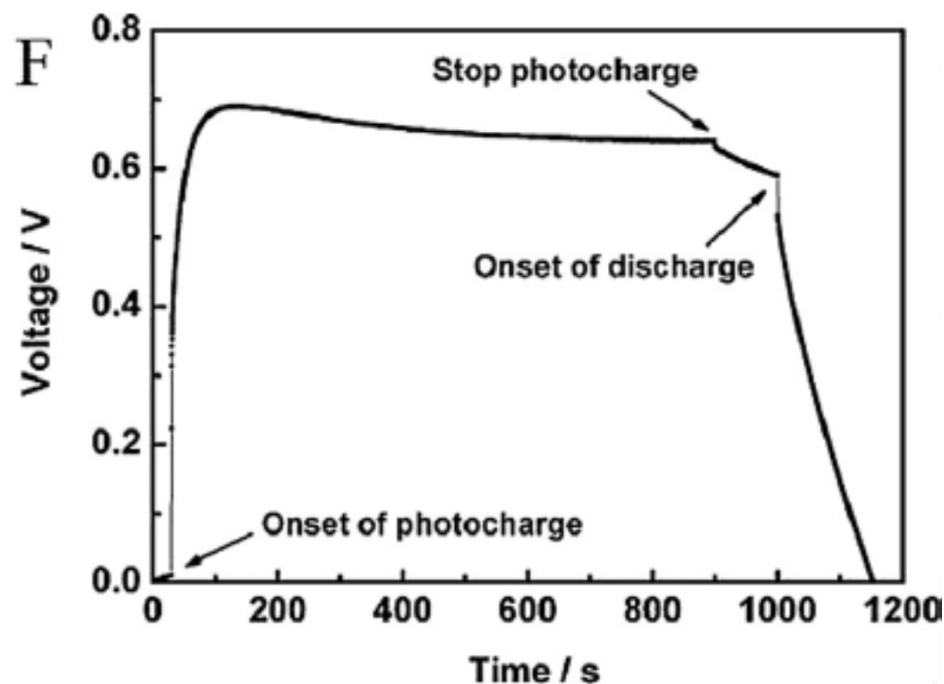
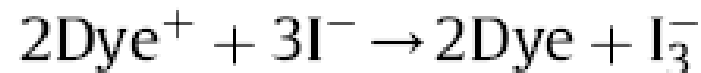
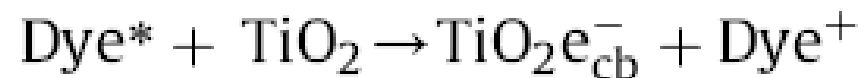


Генерация гидроксил-радикала, окислительная очистка

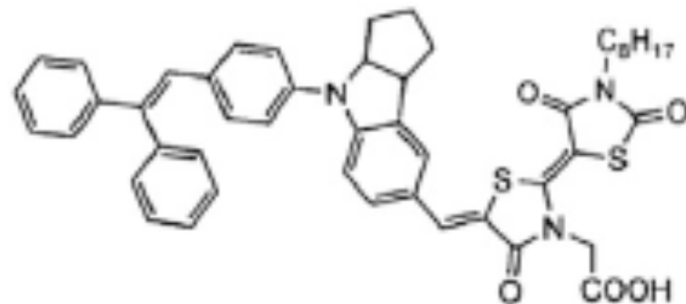
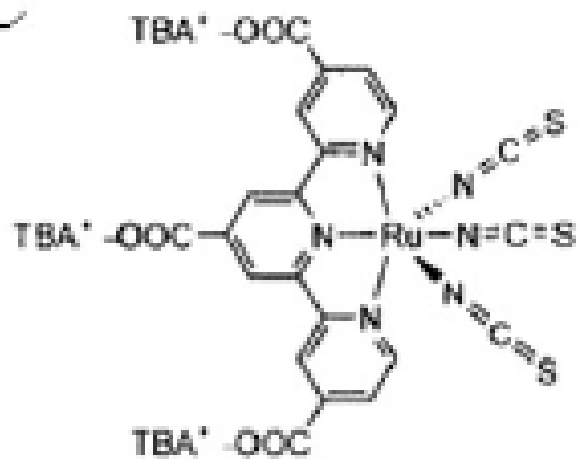




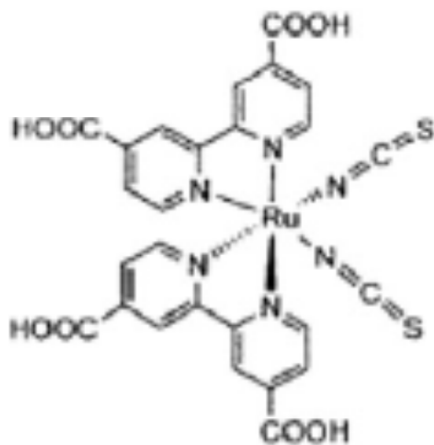
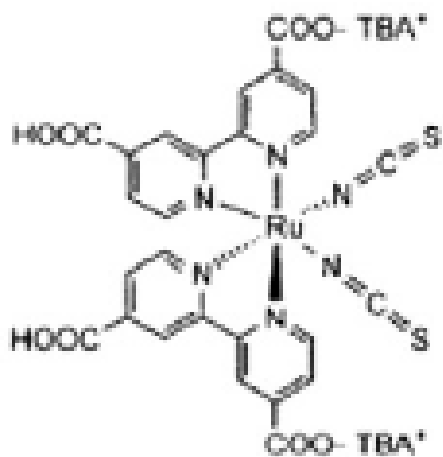
Сенсибилизация



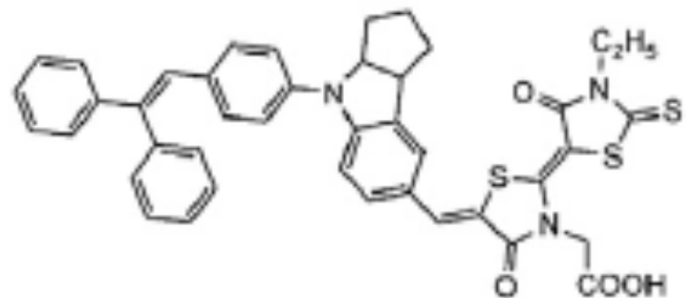
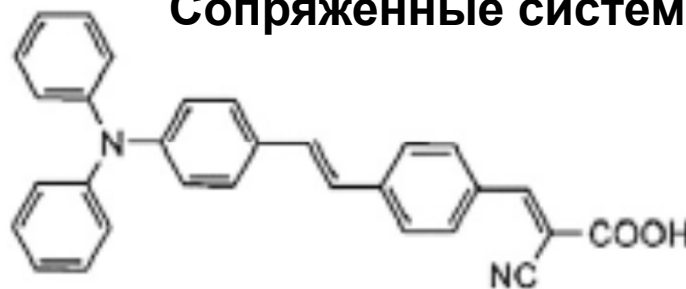
Примеры фоточувствительных органических молекул

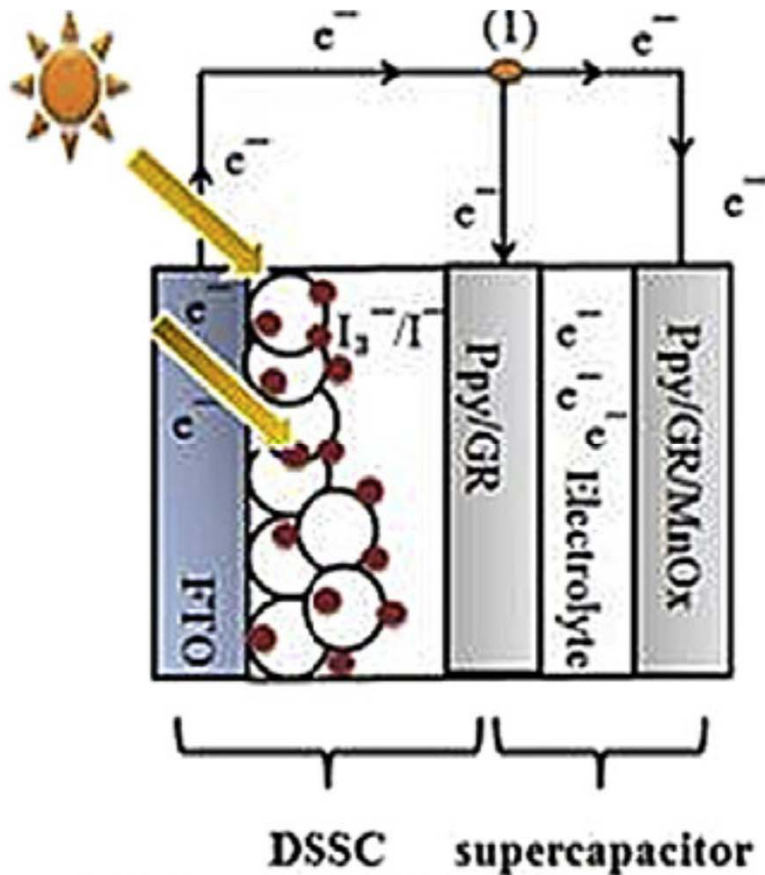


Комплексы металлов



Сопряженные системы



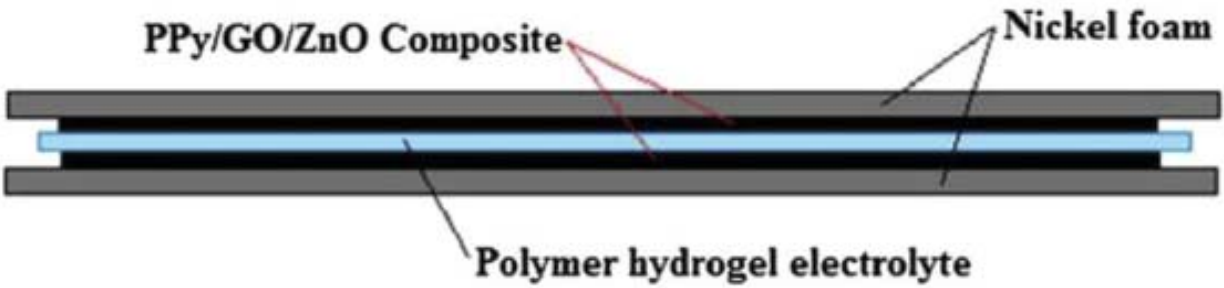


- Dye molecule
- Photoactive metal oxide
- Ppy Polypyrrole
- GR Graphene
- MnOx Manganese (II) oxide

DSSC supercapacitor

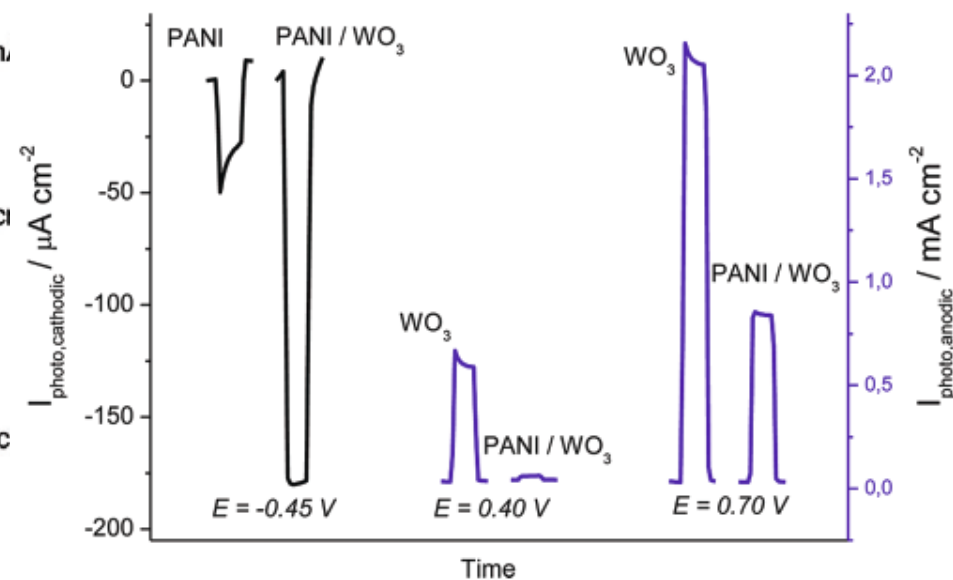
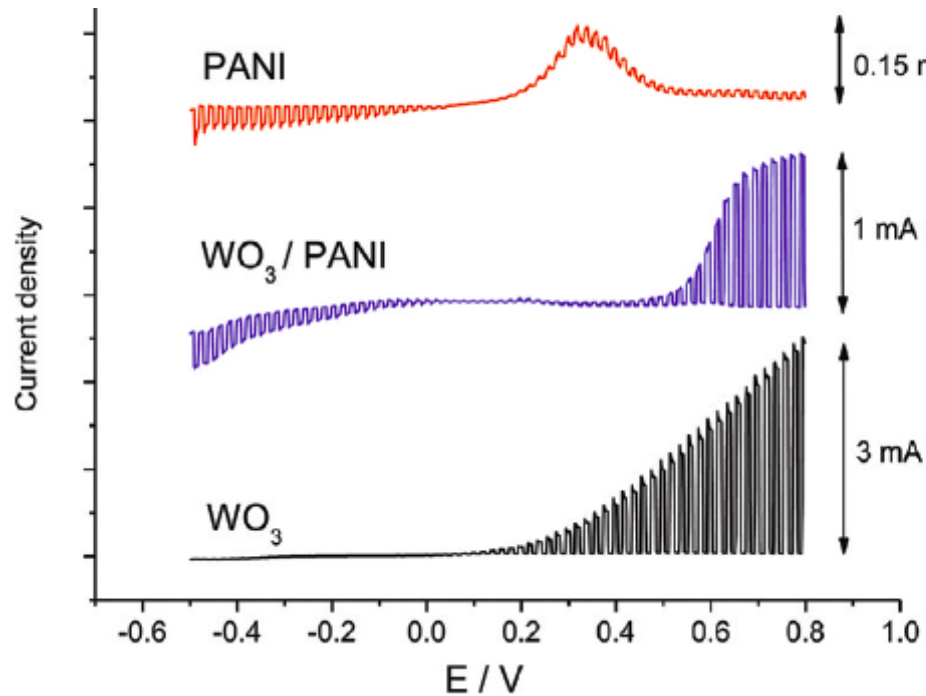
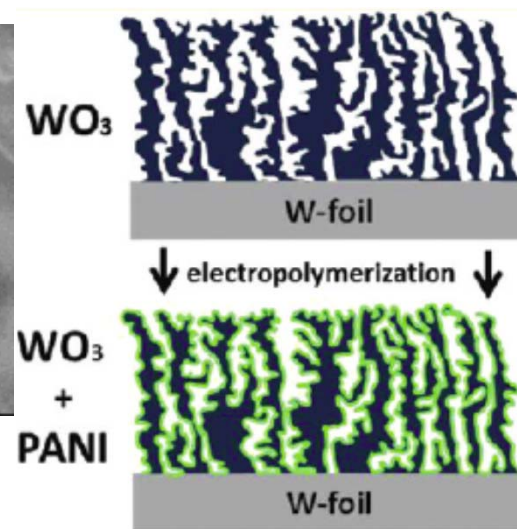
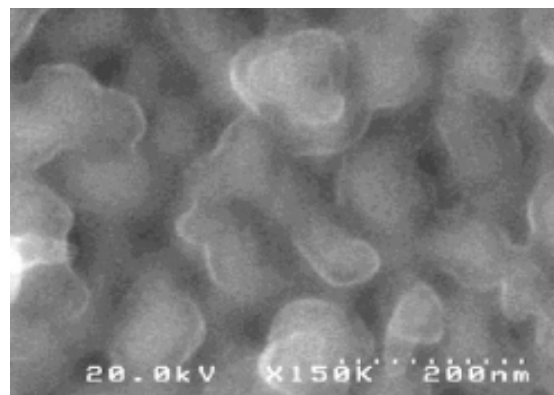
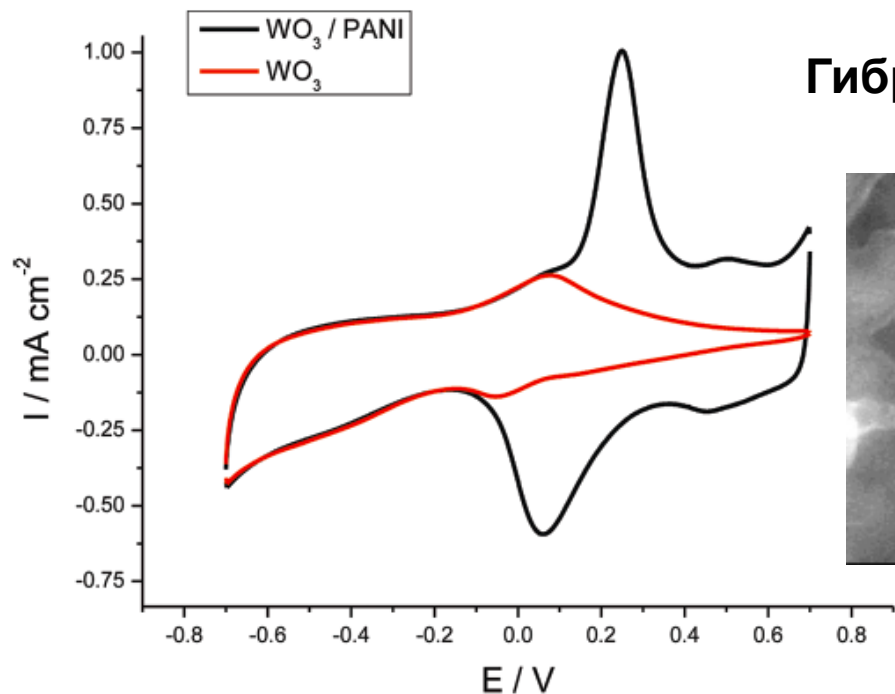


Dye/Sensitizer Semiconductor

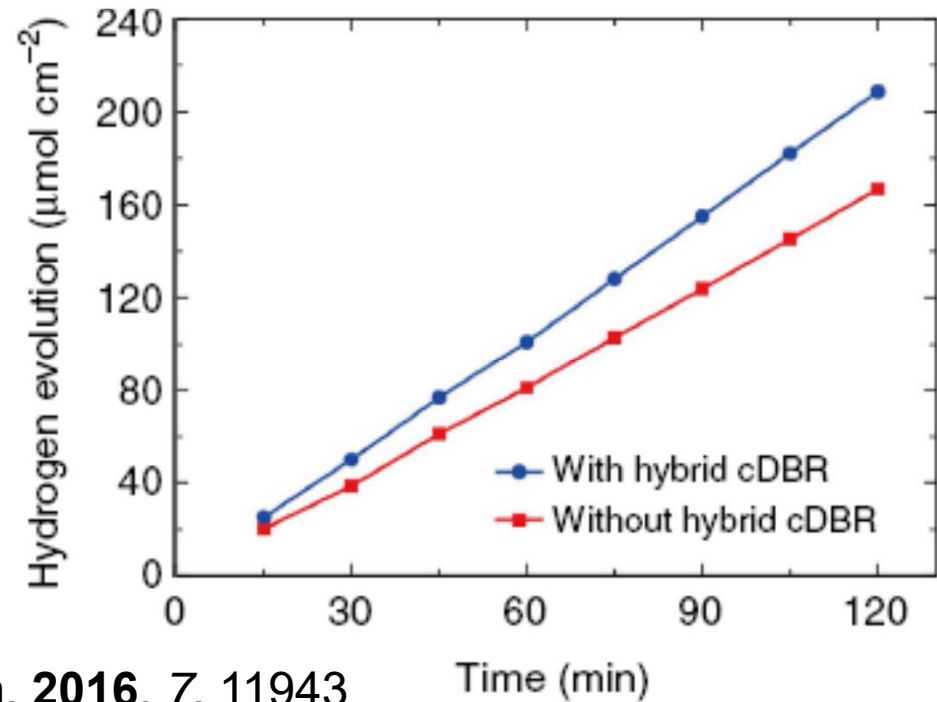
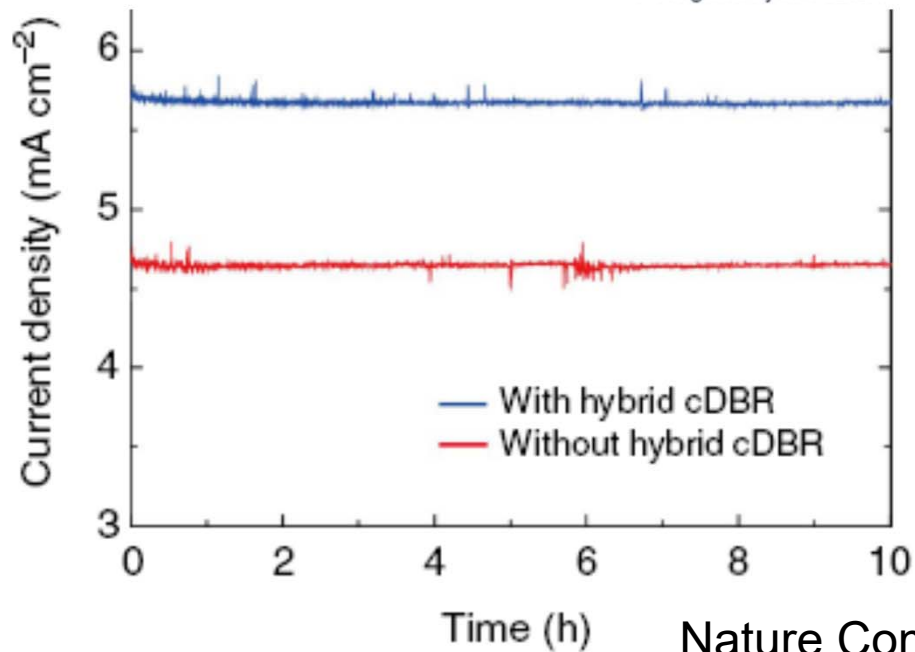
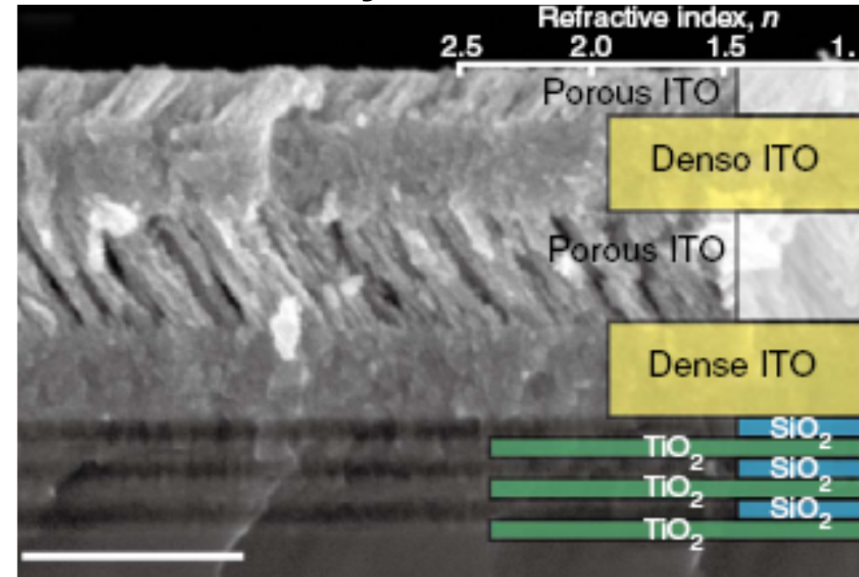
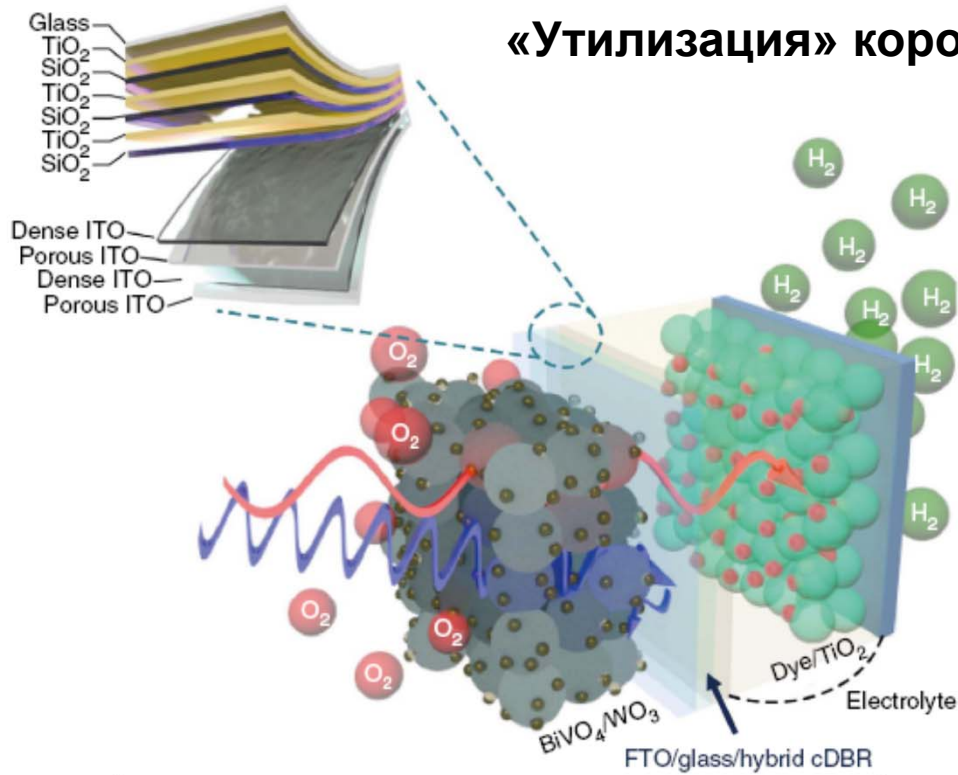


PPy/GO/ZnO Composite Nickel foam
Polymer hydrogel electrolyte

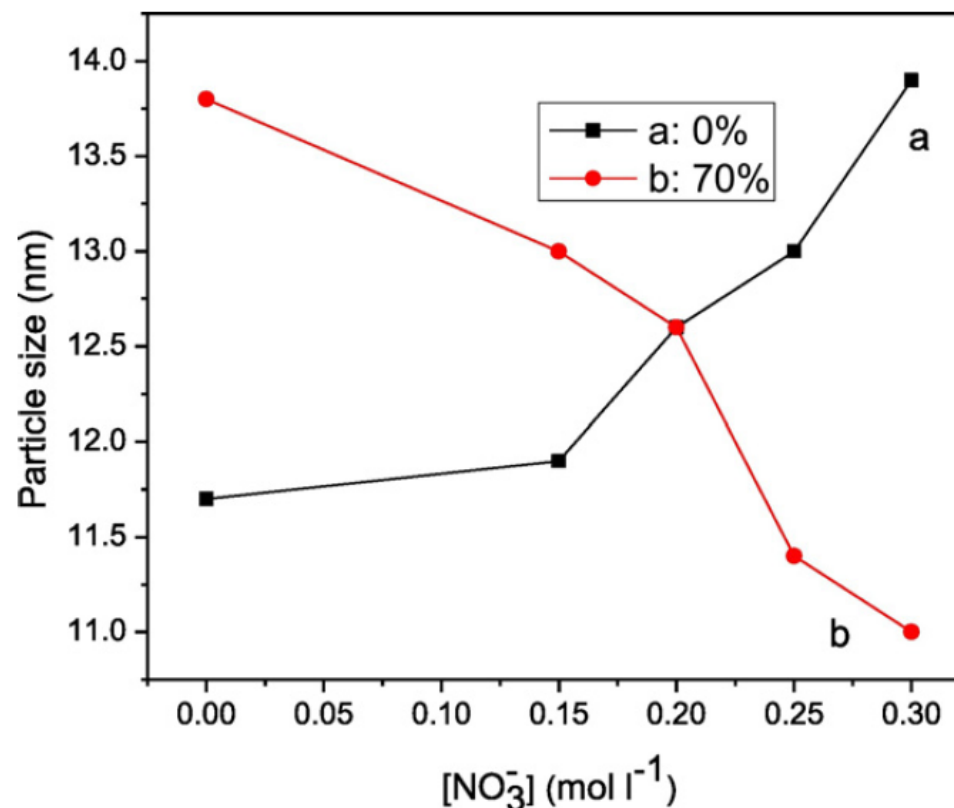
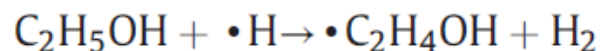
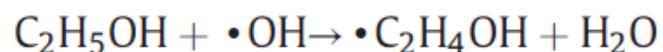
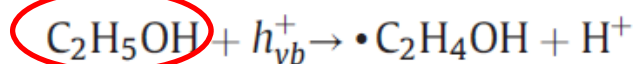
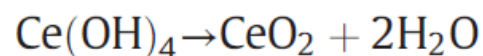
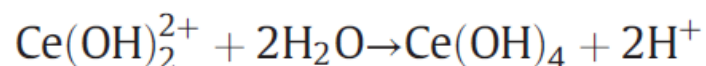
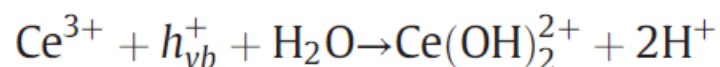
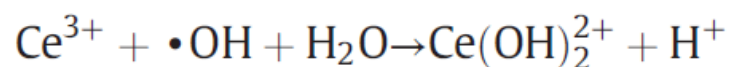
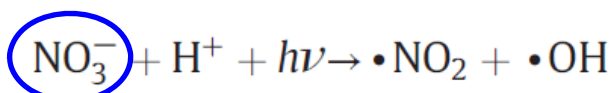
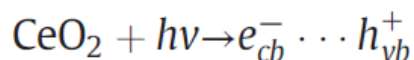
Гибридные полупроводниковые материалы



«Утилизация» коротковолнового излучения



Фотоэлектрохимическое осаждение оксидного полупроводника

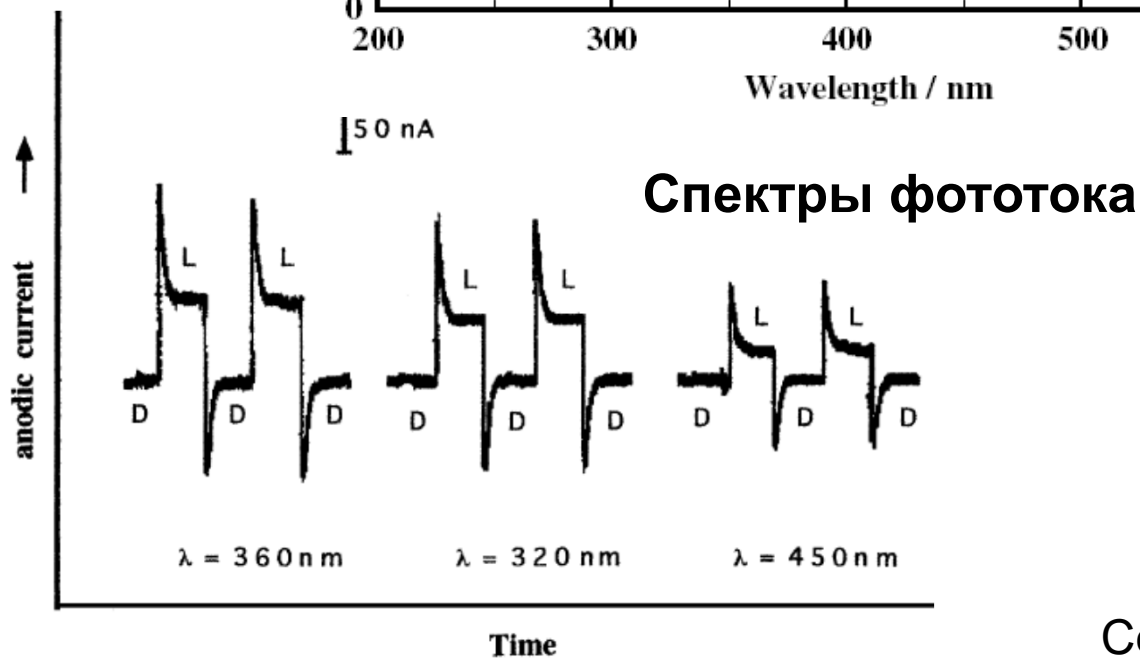
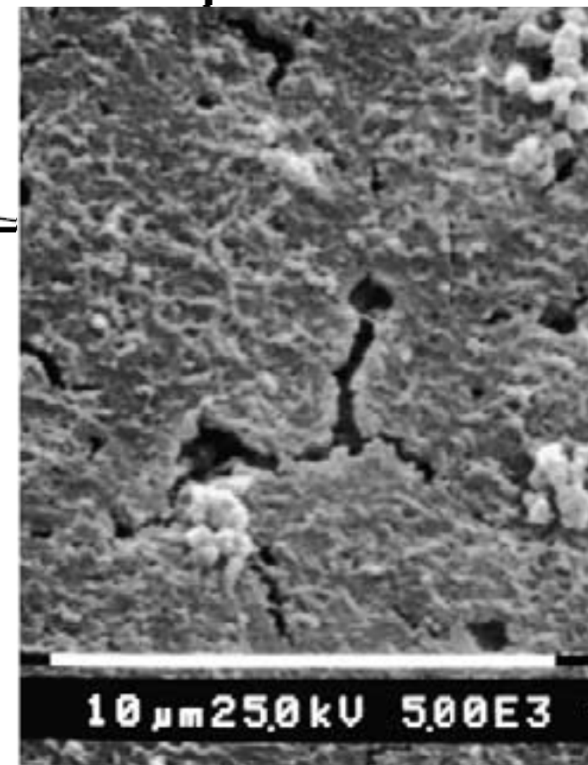
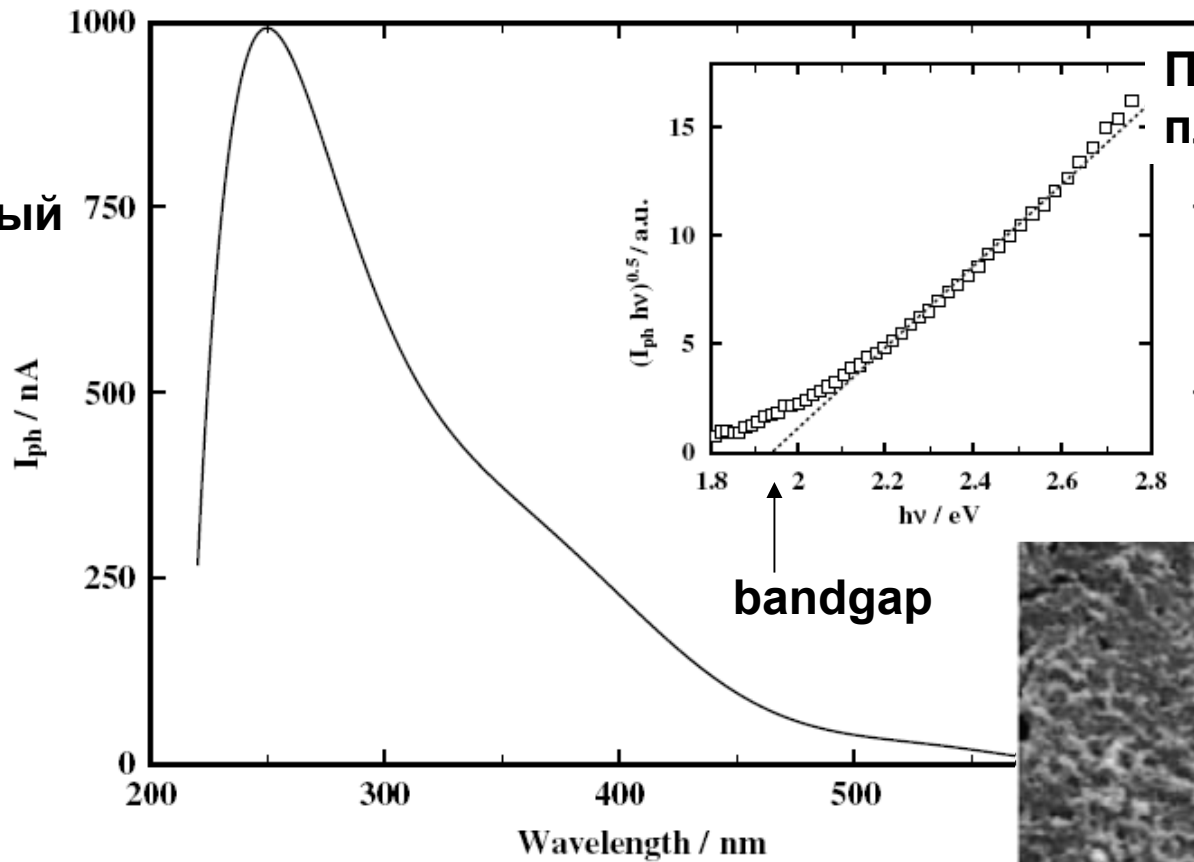


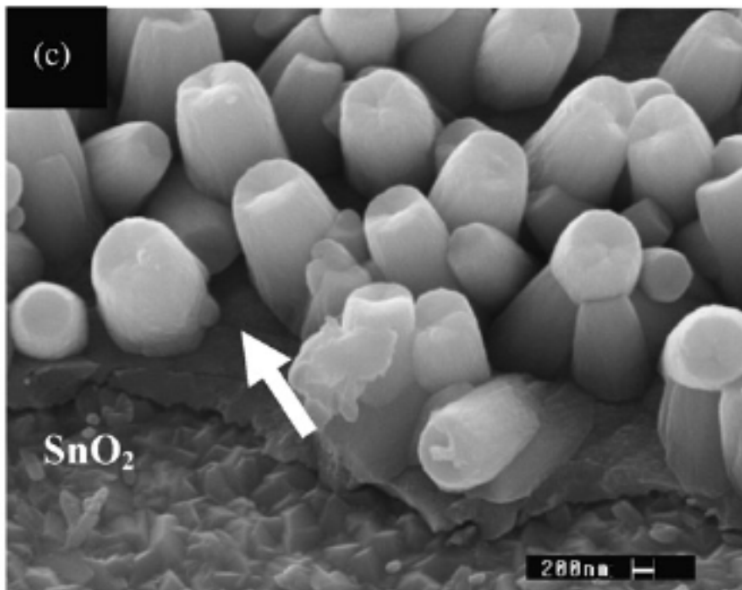
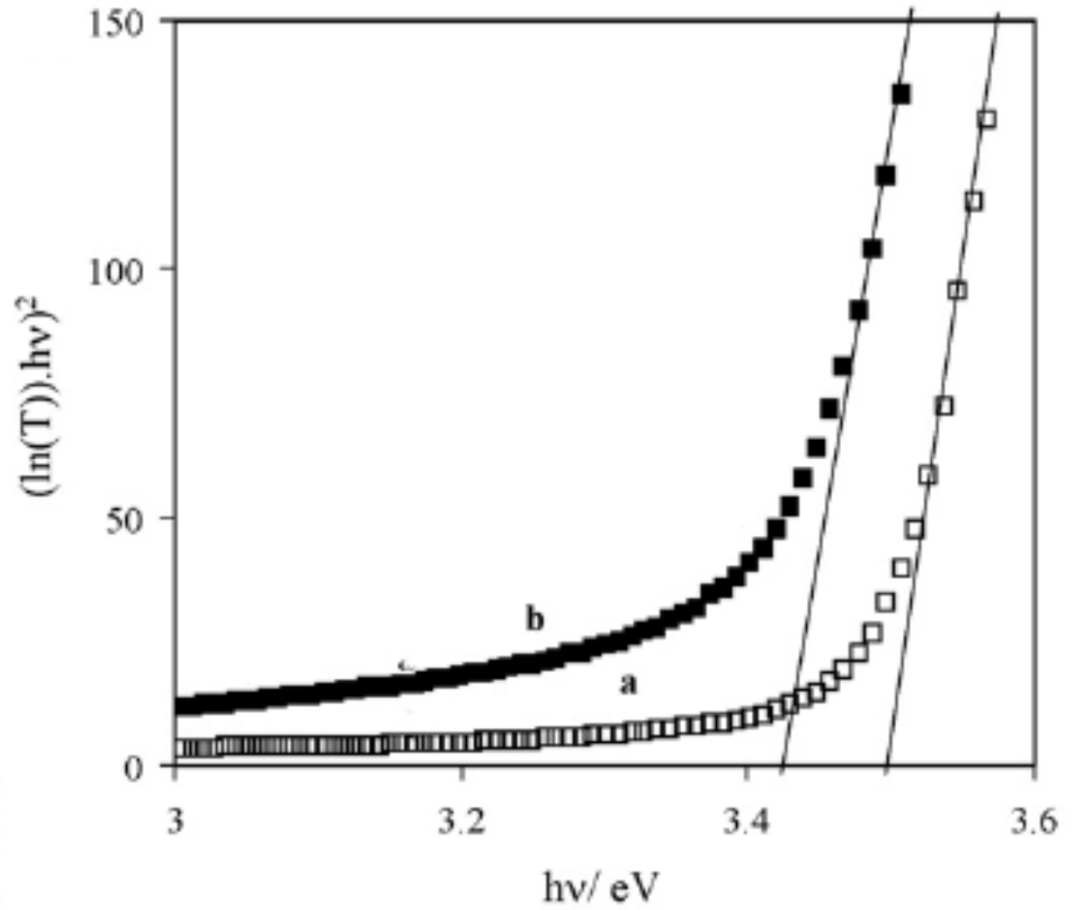
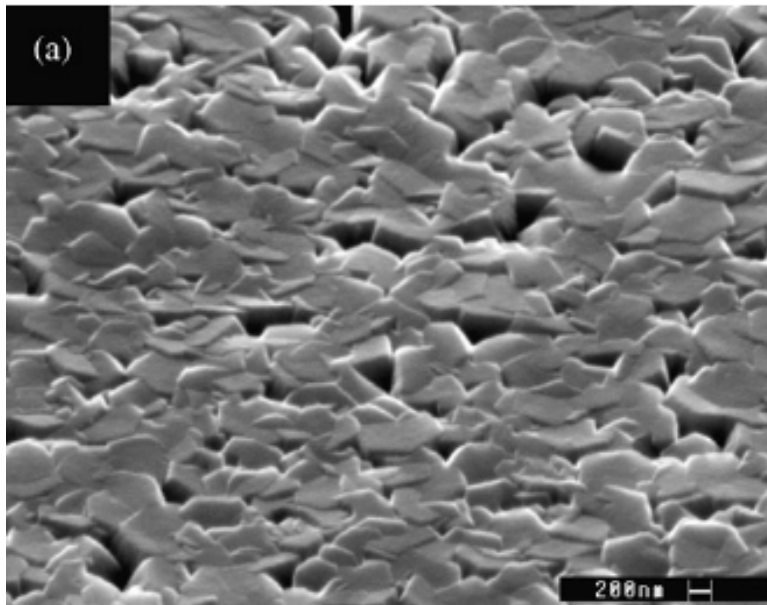
Регулирование роста частиц:
нитрат ↑, этанол ↓

Fe

боратный
буфер

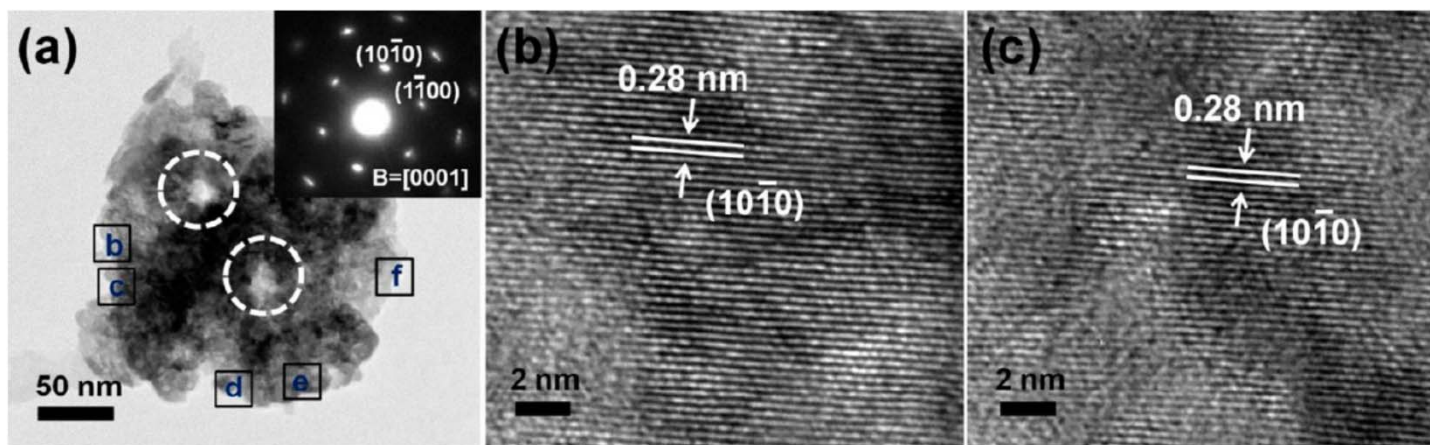
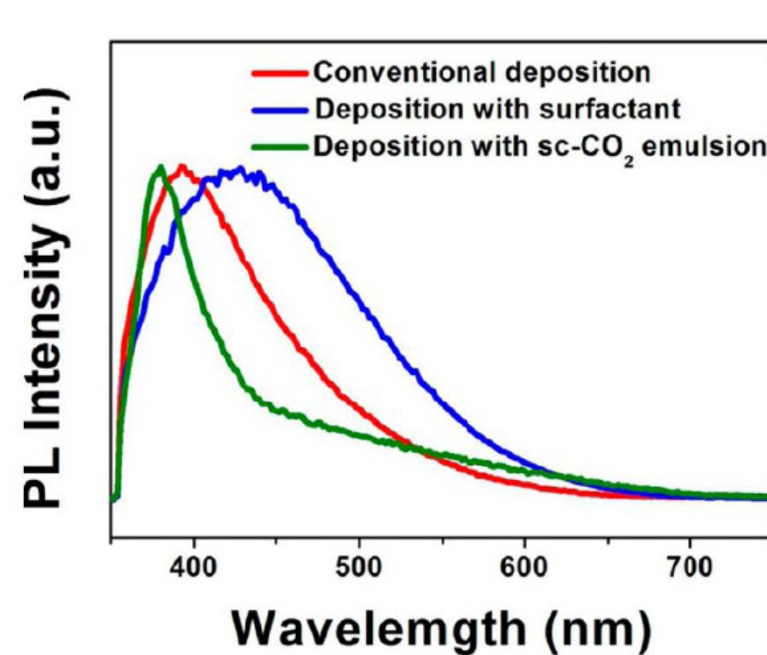
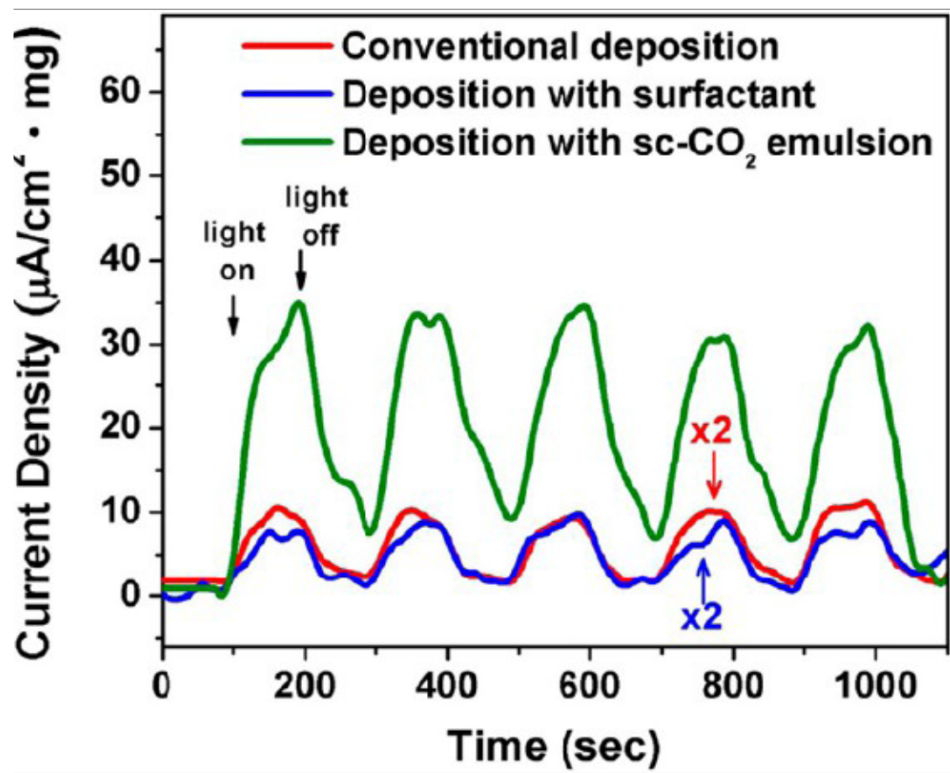
Полупроводниковые
пленки на металлах





ZnO – допирование Eu(3+)

«КВАНТОВЫЕ ТОЧКИ»



Полезные ссылки

A. Kudo, Y. Miseki, Heterogeneous photocatalyst materials for water splitting, *Chem. Soc. Rev* 38 (2009) 253–278.

M.G. Walter et al., Solar Water Splitting Cells, *Chem. Rev.* 110 (2010) 6446–6473.

Z. Li et al., Photoelectrochemical cells for solar hydrogen production: current state of promising photoelectrodes, methods to improve their properties, and outlook, *Energy Environ. Sci.* 6 (2013) 347-370.

Status of Photoelectrochemical Water Splitting: Past, Present, and Future – спецвыпуск *Energy Environ. Sci.* N 8 (2015).

C.H.Ng et al., Potential active materials for photo-supercapacitor: A review, *J. Power Sources* 296 (2015) 169-185.

B. Turan et al., Upscaling of integrated photoelectrochemical water-splitting devices to large areas, *Nature commun.* 7 (2016) 12681.

P. Lianos, Review of recent trends in photoelectrocatalytic conversion of solar energy to electricity and hydrogen, *Appl. Catal. B* 210 (2017) 235–254.