

Tentative FYP Projects*

1. Nanomaterials for energy storage: batteries, capacitors, etc.
2. Small molecular electrocatalysis
3. Electrochemical sensors

*Each project has more than one opening.

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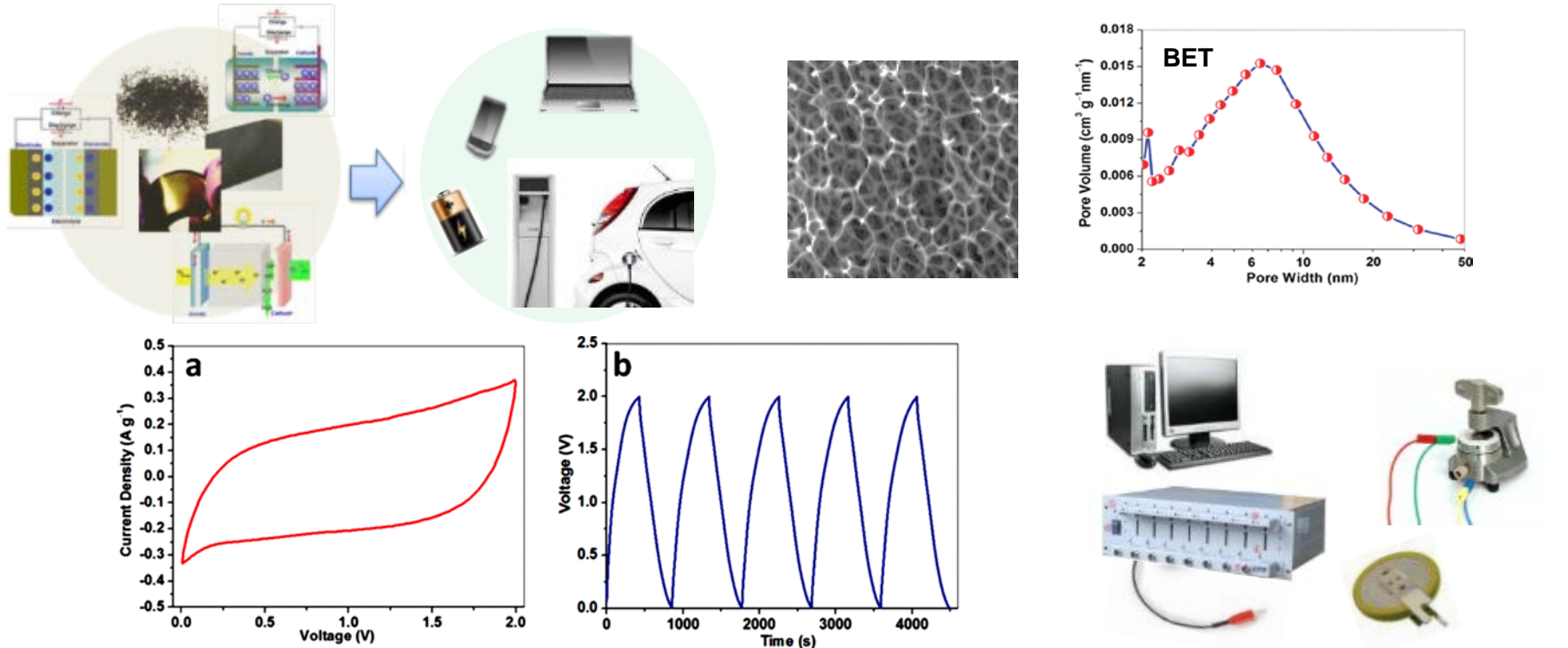
Project 1. Nanomaterials for energy storage: batteries, capacitors, etc.

Description

The development of nanostructured electrode materials is now a promising way to improve energy density and power density of supercapacitors. This project will focus on synthesis of nanomaterial electrodes for supercapacitors.

Method

The research will include synthesis and characterization of electrode nanomaterials and electrochemical performance measurements. The nanomaterials will be synthesized by solid state reactions and wet-chemical methods and the nanomaterials will be characterized by XRD, TEM, BET, TGA, and etc.



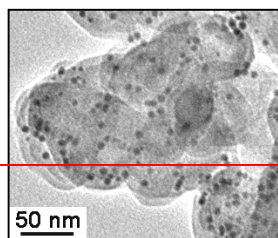
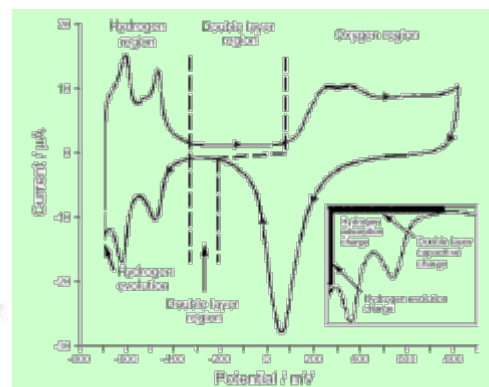
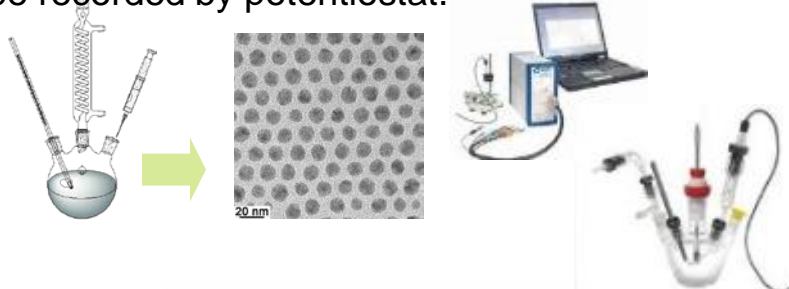
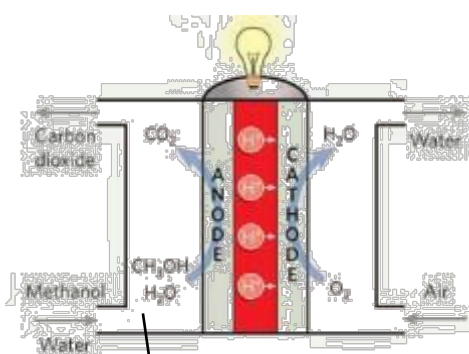
Project 2. Small molecule electrocatalysis

Description

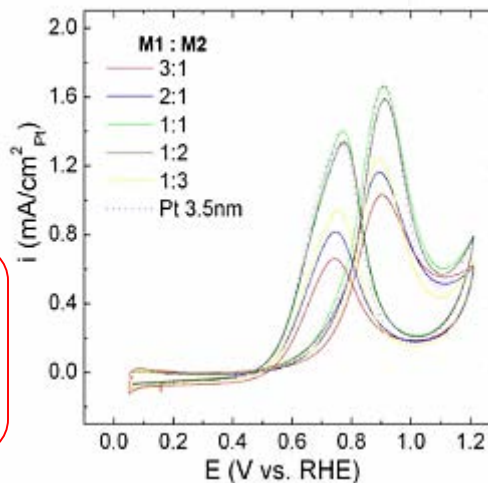
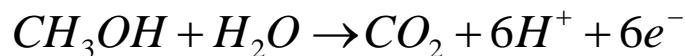
Small molecule electrocatalysis is the critical in fuel cells and electrolyzers. They are also interesting in electrosynthesis of valuable chemicals.

Method

The research will include synthesis of nanoparticle electro-catalysts and electrochemical measurements. The electro-catalysts will be synthesized by chemical methods and characterized by XRD, HRTEM, XPS, FT-IR, CV, and etc. The electrochemical measurement will be performed in a three-electrode system and the activity will be recorded by potentiostat.



Anode



Toshiba Dynario Direct Methanol Fuel Cell Charger

Project 3. Electrochemical sensors

Description

The project aims to develop new materials and approaches for electrochemical detection of small molecules, bacteria, toxins, etc.

Method

The project will include synthesis and characterizations of metal and oxide nanoparticles. The nanoparticles will be surface-modified with bio-ligands like antibody to target the bacteria. The electrochemical impedance will be measured to determine the bacteria quantity.

