

# 胡啟章 教授

CHI-CHANG HU, DISTINGUISHED PROFESSOR

- 國立成功大學 學士，民國八十年
- 國立成功大學 博士，民國八十四年
- B.S. Ch.E. National Cheng Kung University, 1991
- Ph.D. Ch.E. National Cheng Kung University, 1995



## 主要研究領域

本實驗室研究興趣在結合電化學科技與材料之結構奈米化、鑑定技術與應用。並討論製備方法、材料特性與電化學應用上之關係。

### ■ 電化學能源材料

此研究主題主要應用領域為超高電容器、金屬空氣電池與鋰/鈉電池。本實驗室是國際上超高電容技術的先驅研究單位。鋰/鈉電池方面正在執行台德鋰電池計畫。水系電池以鋅系電池為主導研究方向。

### ■ 電化學功能材料

此研究主題主要應用領域為電化學脫鹽、電化學消毒系統開發、電催化二氧化碳還原、光電降解有機物。研究主題亦包含石墨烯、奈米氧化物與其複合材料、規則陽極鋁氧化物與鈦氧化物的開發與應用。

### ■ 功能性材料電鍍

單一晶相銅箔與特殊功能銅箔電鍍、無鉛錫料合金凸塊電鍍與鐵族合金電鍍。

## Main Research Interests

My group mainly focuses on the combination of electrochemistry and microstructure designs of advanced materials. The relationships among preparation, textural characteristics, electrochemical properties, and applications of advanced materials are established.

### ■ Electrochemical energy storage/conversion systems

We develop advanced supercapacitors, aqueous Zn-based batteries, and lithium/sodium batteries. My group is one of the pioneers in the supercapacitor technologies. We have a Taiwan-Germany joint project focusing on advanced Li-/Na-based batteries.

### ■ Electrochemical functional materials

We focus on the electrochemical desalination of brackish water and sea water as well as the electrochemical disinfection techniques. We also investigate electro-photo-catalytic processes of CO<sub>2</sub> reduction and advanced oxidative processes for organic degradation. We also focus on the preparation, characterization of graphene, heteroatom-doped graphene, ordered AAO, and TiO<sub>2</sub> nanotube arrays for various applications.

### ■ Functional materials electroplating

We investigate the electroplating techniques of copper with controllable microstructures (e.g., nanotwinned copper) or special functions (e.g., deformation). We also focus on the electroplating of lead-free solder bumps and iron-group alloys.

## 代表作 (Selected Publications)

- **Hu, C.-C.\***, et al., "Investigating the self-discharge mechanism in electrical double-layer capacitors with low-concentration carbonate additives", *J. Energy Storage* 115 (2025) 115863.
- **Hu, C.-C.\***, et al., "Twin spacing manipulation of (111)-oriented nanotwinned copper via aeration flow control in a high-speed direct-current electroplating system with thiol organic additives", *J. Mater. Chem. A* 13(7) (2025) 5386-5399.
- **Hu, C.-C.\***, et al., "Memory effect: From membrane-based towards membrane-less and membrane-free faradaic deionization", *Desalination* 591 (2024) 117983.
- **Hu, C.-C.\***, et al., "Evaluating the sensitizing effect on the photocatalytic decoloration of dyes using anatase-TiO<sub>2</sub>", *Applied Catalysis B: Environmental*, vol. 148-149, pp. 250-257, 2014.
- **Hu, C.-C.\***, et al., "A Cost-Effective Supercapacitor Material of Ultrahigh Specific Capacitances: Spinel Nickel Cobaltite Aerogels from an Epoxide-Driven Sol-Gel Process", *Advanced Materials*, 22 (2010) 347-351.
- **Hu, C.-C.\***, et al., "Design and tailor the nanotubular arrayed architecture of hydrous RuO<sub>2</sub> for supercapacitors of next generation" *Nano Letters*, 6, pp. 2690-2695, 2006.



教授簡介

Department of Chemical Engineering

