



明志科技大學
MING CHI UNIVERSITY OF TECHNOLOGY


四技部工讀實務實習

102年成果發表展示會

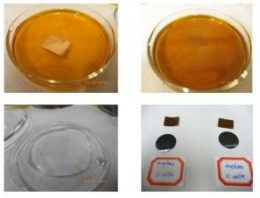
工作項目

TOPIC


Preparation of Graphene and Graphene Oxide Thin Film



Preparation of Graphene - CVD



Graphene Sample



Preparation of Graphene Oxide

內容摘要

Abstract

Graphene (G), and its derivatives, is an ideal two-dimensional material. It is comprised of a single sheet of hexagonally packed carbon atoms. Graphene has attracted significant research interest because of its excellent properties.

Nanocomposite Graphene Materials

The Two-Dimensional Material Graphene:
The 2010 Nobel Prize in Physics: Andre Geim and Konstantin Novoselov at the University of Manchester

Graphene is an allotrope of carbon whose structure is a single planar sheet of SP² bonded carbon atoms, that are densely packed in a honeycomb crystal lattice

- High electrical conductivity (mobilities >200,000 cm²/Vs)
- Excellent mechanical strength
- Tensile strength of ~1 TPa
- Light weight
- Hydrophobic
- Heat resistant
- Corrosion-resistant

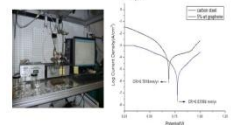
purpose

1. large-scale growth of Graphene.
2. Get low cost, large production.
3. Application.

Corrosion-resistance coating

Graphene material preparation
Coating process
Coating strength
Corrosion-resistance of coating

Corrosion-resistance tests

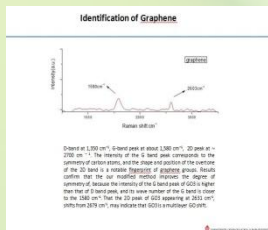


Electrochemical Evaluation of Corrosion-resistance Performance

Working electrode: Sample coated with graphene or its derivative
Reference electrode: SCE, saturated calomel electrode
Counter electrode: Pt plate
Electrolyte: 3.5% NaCl
Corrosion Rate: $i_{corr} \times R^2 \times EW_p$

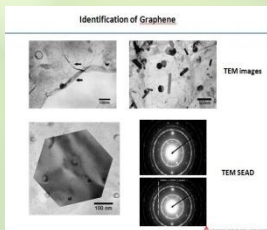
實習成果

Raman test



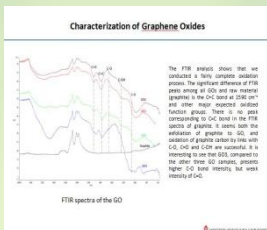
Graphene Oxide

TEM Images



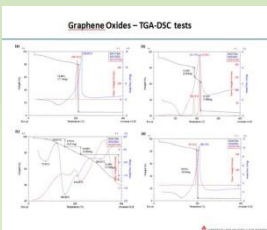
TEM Images

FTIR

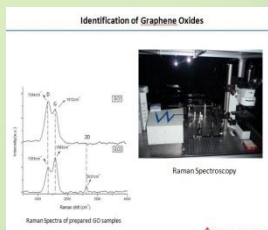


Electrochemical

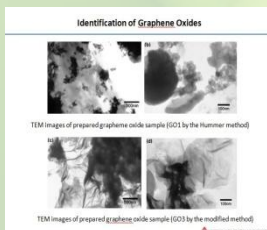
TGA



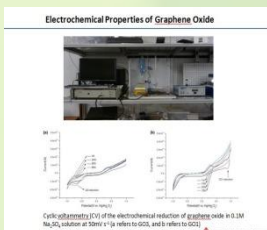
Conclusions



Raman Spectroscopy



TEM images of prepared graphene oxide sample (GO1) by the Hummer method



Cyclic voltammetry (CV) of the electrochemical reduction of GO in 0.3 M Na₂SO₄ solution at 50mV s⁻¹ (a) refers to GO, and b) refers to GO1

- ### Conclusions
1. Success in preparation of both Graphene and Graphene oxides
 2. Raman spectra strongly demonstrated the improvement of the order and the symmetry of synthesized graphene oxides (GO) by a modified Hummer's method.
 3. The further washing procedure under lower pH value made the synthesized GO generate the weaker C/O functional groups, and thus made the consequent electrochemical reduction of GO easier.
 4. The prepared GO is also photo-active in a wide both UV and VIS spectrum (200 nm to 650 nm).
 5. Lower thermal stabilities of the GO may limit the optimal temperatures of GOs materials below 200 °C. In an alternative view, the lower thermal stability of GO opens a path to activate the stable carbon precursors via the repeated reactivity of the synthesized GO under lower temperatures.
 6. Potentials to prepare corrosion-resistance coating using G or GO

材料工程

實習單位: Western Kentucky University

實習廠區: ICSET

實習期間: 2012/9~2012/9

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