Synthesis of Reduced Graphene Oxide Wrapped TiO2 Ball Composites for Enhanced Photodegradation of Methylene Blue

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Outline

- Introduction
- Why TiO_2 and Graphene
- Characterizations
- Photocatalytic Performance
- Summary

Introduction

Dye pollutants

- Over 15% of the total amount of dyes used is lost in dyeing process
- High toxicity, slow biodegradation and potential carcinogenicity
- Difficult removal by physical treatment

Photocatalysis

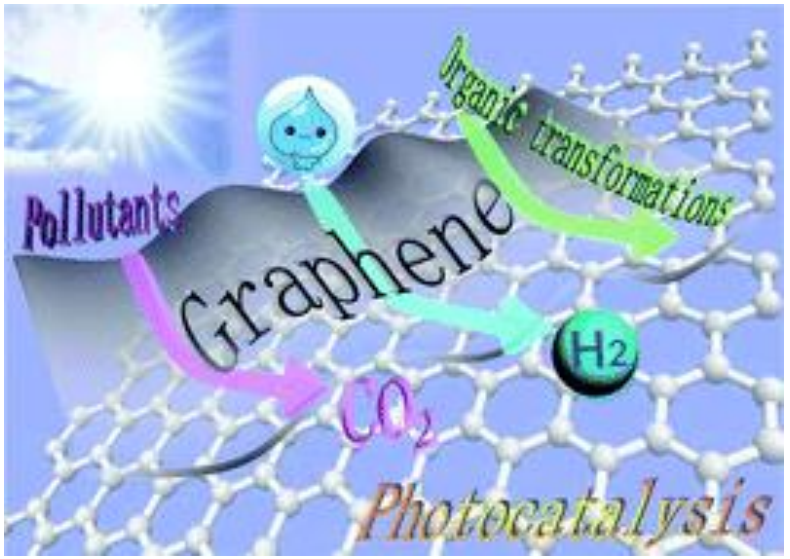
- Accelerating nature's cleaning and purifying process using light as energy
- Easy removal
- Cost efficiency

Why TiO_2 and Graphene ?

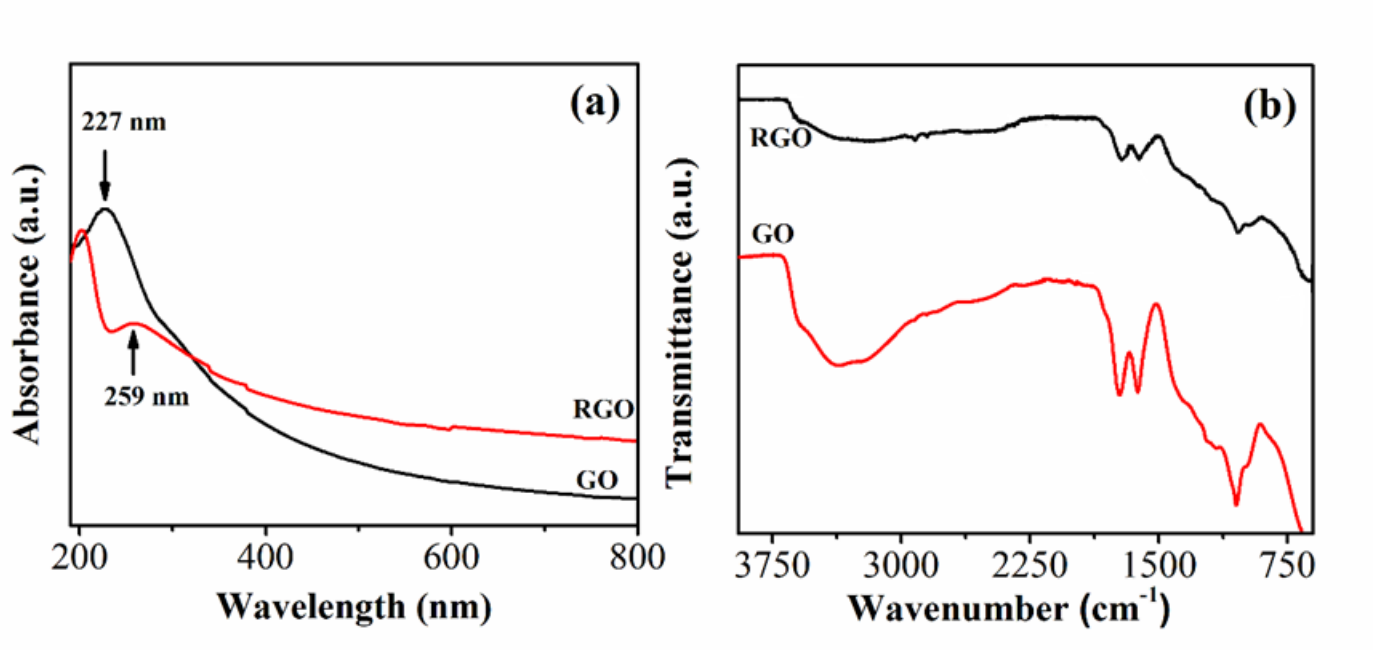
- Low cost
- Innoxiousness
- Chemical inertness
- High photocatalytic performance

Why TiO_2 and Graphene ?

- Two-dimensional material
- Best electrical conductivity of any material
- Enhance the photocatalytic performance of traditional photocatalysts

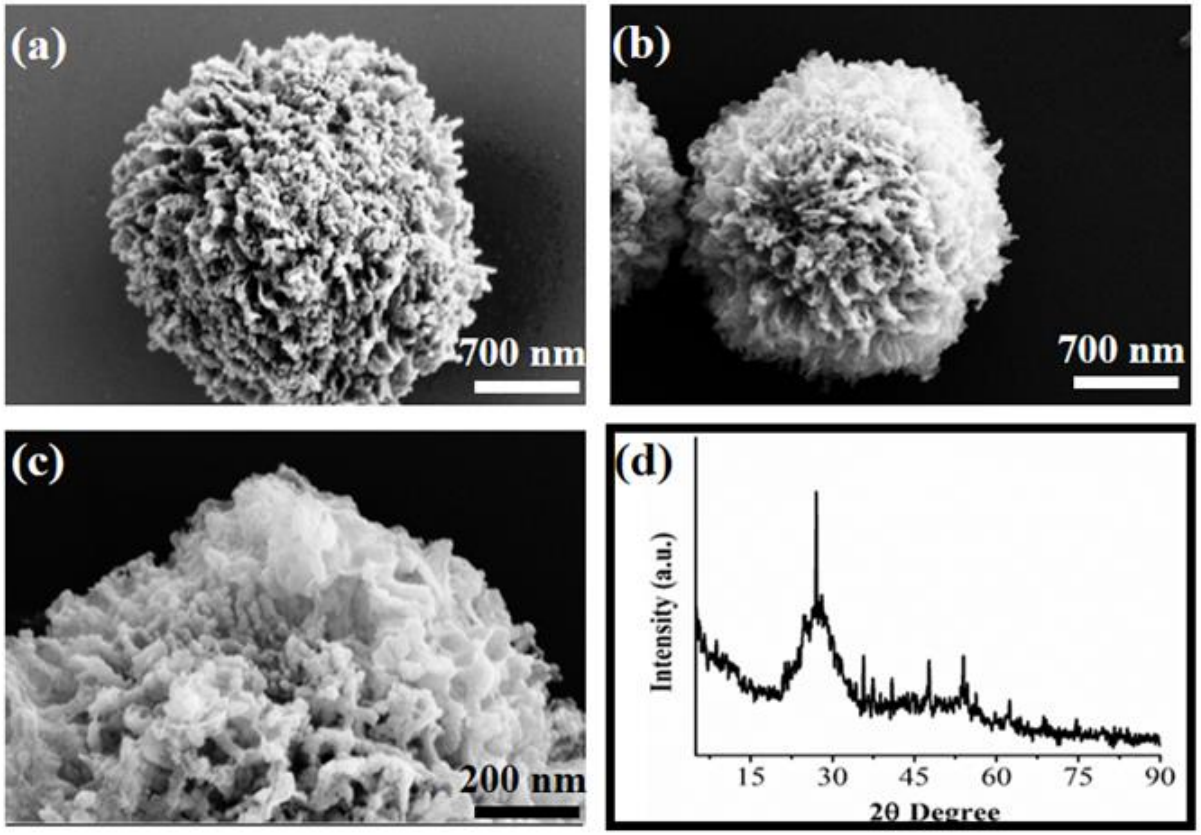


Characterizations

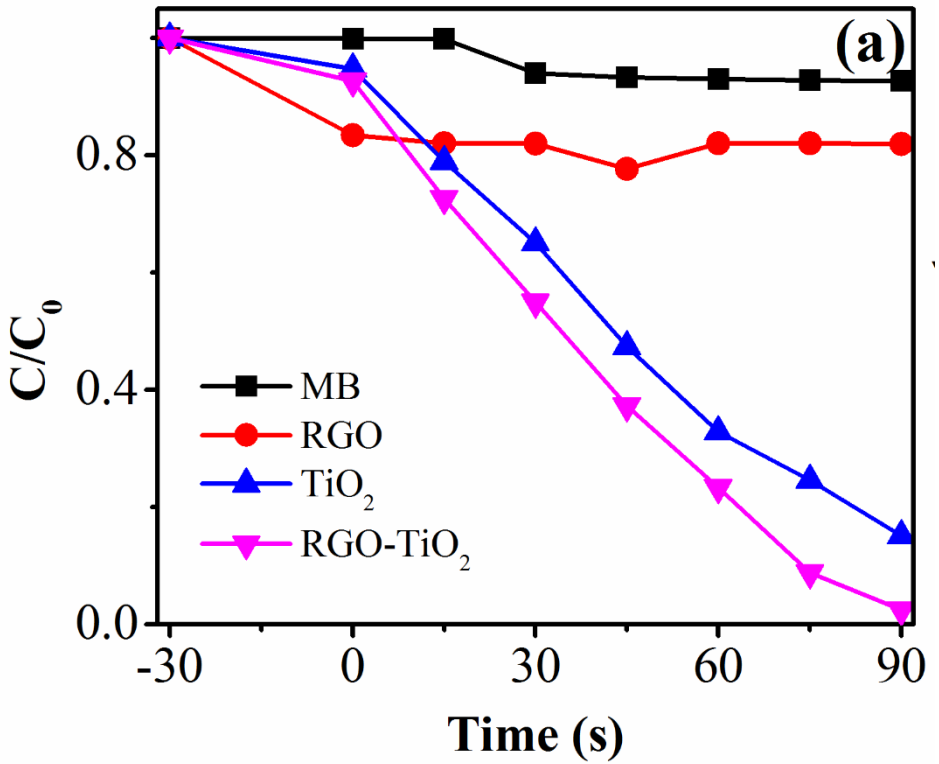


UV-vis spectroscopy and FTIR confirmed the reduction of graphene oxide

Morphology

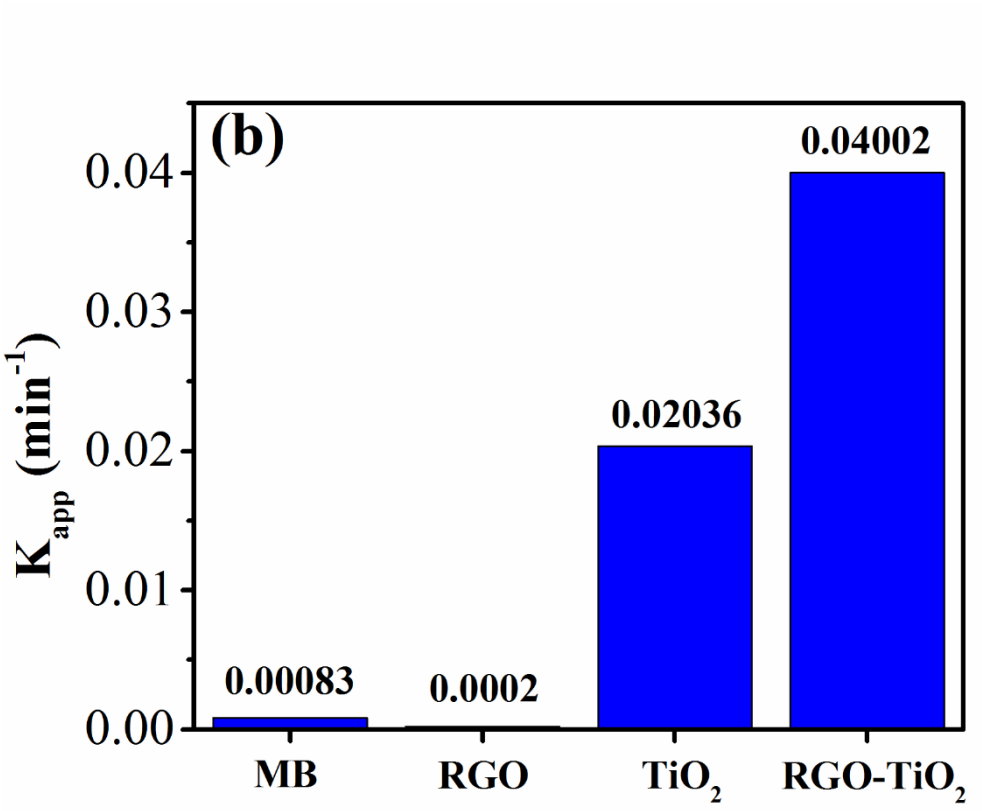

(a)
700 nm
(b)
700 nm
(c)
200 nm
(d)
Intensity (a.u.)
15
30
45
60
75
90
2θ Degree

Photocatalytic Performance



- RGO-TiO_2 showed best photocatalytic performance

Photocatalytic Performance



Summary

- RGO wrapped TiO_2 ball composite was synthesized by two step hydrothermal reactions
- UV-vis spectroscopy and FTIR confirmed the reduction of graphene oxide
- XRD analysis confirmed the formation of anatase phased TiO_2
- The degradation rate constant of using RGO-TiO_2 composite was twice higher than pure TiO_2 balls