Junior Science Communications
Faculty of Applied Sciences, UiTM Shah Alam
https://journal.uitm.edu.my/ojs/index.php/JSC

E-ISSN 2637-0689
Vol 32 2024

Colloquium on Applied Sciences - CAS 2023
17-18 July 2023, Faculty of Applied Sciences, UiTM Shah Alam, Malaysia

Photocatalytic Activity of ZnO/CdS-Activated Carbon for Degradation of Tetracycline

Neesha Irdeanna Ahmad Arshad[a], Mohd Lokman Ibrahim[b*]

Structured Abstract

Background: ZnO suffer from wide band gap, and poor surface reactions. Therefore, CdS is introduced to the ZnO as composite to enhance visible light harvesting and charge separation by using wet impregnation. Next, the as-prepared ZnO/CdS is coated on activated carbon to increase the surface area and has a potential to improve the performance of ZnO/CdS photocatalyst.

Methods: ZnO photocatalyst was grown on an activated and impregnated by CdS to increase the efficiency of ZnO under visible light. The ZnO/CdS-AC was prepared with molar ratios ZnO/CdS-AC 1:0.5, ZnO/CdS-AC 1:1, ZnO/CdS-AC 1:2, ZnO/CdS-AC 1:4, ZnO/CdS-AC 1:6 to determine the degradation rate of each photocatalyst. Then, the photocatalytic activity potential of ZnO/CdS-AC was characterized by using XRD, FESEM, BET, FTIR and UV-VIS NIR to determine its physicochemical and optical properties.

Results: The best photocatalyst that is prepared is ZnO/CdS-AC 1:6 with a degradation rate higher than 92% within 180 minutes with a value of catalyst loading only 10 mg. The value of total surface area from BET analysis of ZnO/CdS that is obtained is 19.664 $m^2g^{-}1$ and with a mesoporous type of pore. The band gap of ZnO is appear on the visible light region when it impregnated with CdS with a value of band gap 2.6 eV.

Conclusion: The ZnO is successfully prepared and grown on activated carbon and impregnated by CdS using wet impregnation method. The produced ZnO/CdS-AC photocatalyst has excellent photocatalytic activity when exposed to visible light, and the ability to degrade TC solution.

Keywords: Zinc oxide (ZnO), cadmium sulphide (CdS), activated carbon (AC), tetracycline (TC)

*Correspondence: mohd_lokman@uitm.edu.my

[a]School of Applied Chemistry, Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Malaysia
[b]School of Chemistry and Environment, Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Malaysia