

Simultaneous removal of toxic metal ion and organic pollutant from water using functionalized g-C₃N₄ Photocatalysts



Timothy O. AJIBOYE^{1,2}, Damian C. ONWUDIWE^{1,2}

¹ *Material Science Innovation and Modelling (MaSIM) Research Focus Area, Faculty of Natural and Agricultural Sciences, North-West University, Mafikeng Campus, Private Bag X2046, Mmabatho 2735, South Africa*

² *Department of Chemistry, School of Physical and chemical Sciences, Faculty of Natural and Agricultural Sciences, North-West University, Mafikeng Campus, Private Bag X2046, Mmabatho 2735, South Africa*

Corresponding Author Email: timaji2003@gmail.com

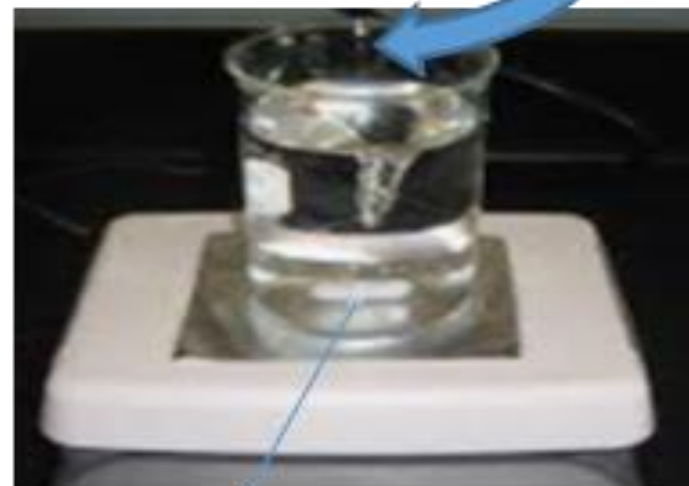


Introduction:

The joint existence of organics and heavy metals in industrial wastewater is a prevailing challenge. There are usually synergistic toxic effects from these pollutants and it may lead to the death of man and animals[1]. Hence, their removal from polluted water is necessary. The focus of this study is to jointly eliminate organic pollutants and heavy metals from wastewater by using functionalized graphitic carbon nitride as photocatalyst. The representative pollutants for the studies are methylene blue and hexavalent chromium.

Methods:

Ethylene glycol +
SnCl₂ +
Hydrated
Bi(NO₃)₃.



Magnetic
stirrer



180 °C for 24 h

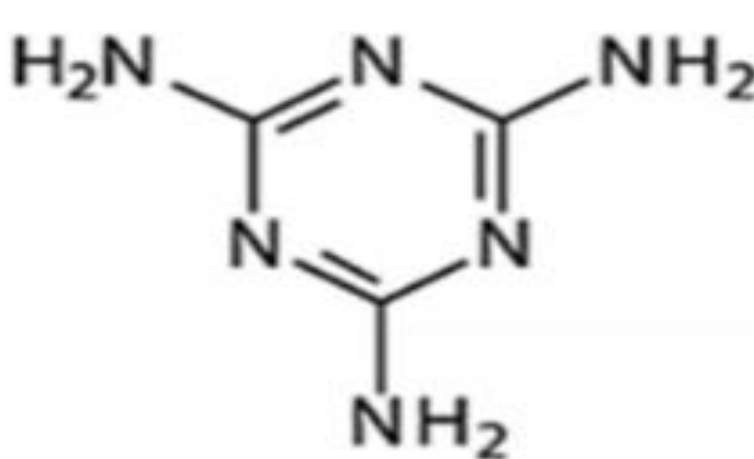


Washed by
centrifuging



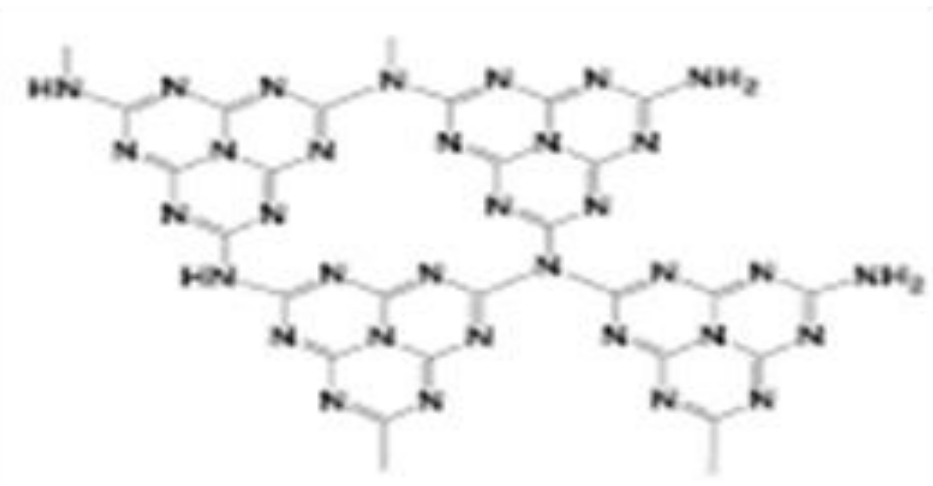
Dried at 80 °C
for 6 h

Sn-doped BiOCl



Melamine

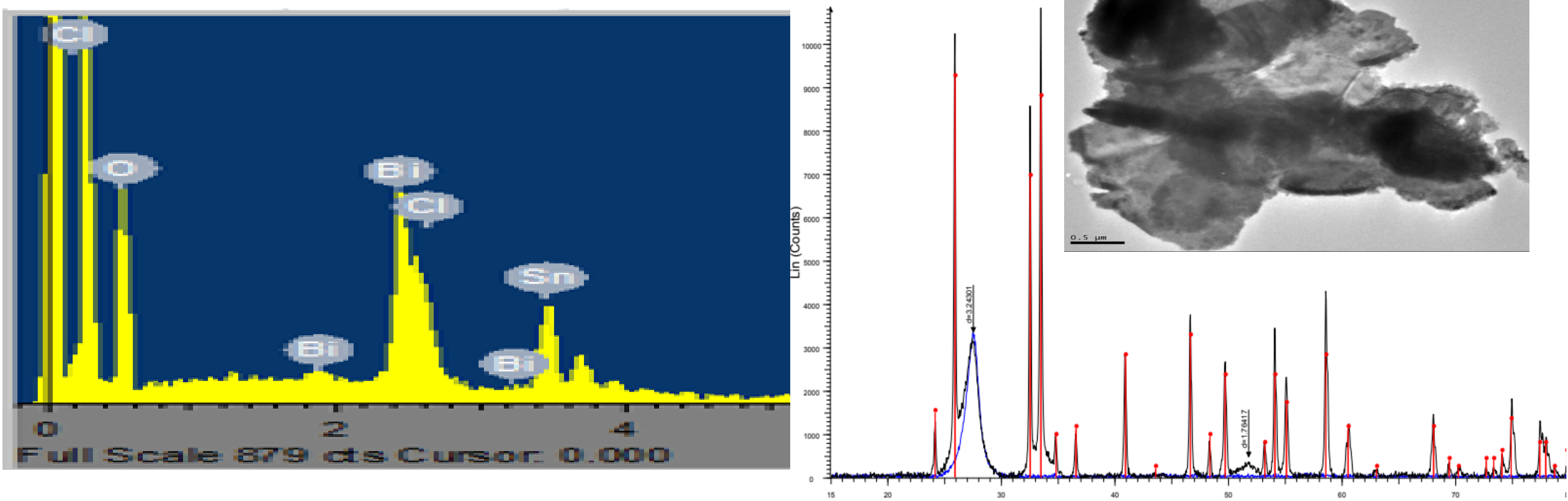
calcination
→



Graphitic carbon nitride

Sn-doped BiOCl
functionalized
graphitic nitride

Results:



EDS,SEM and XRD of Sn-doped BiOCl

Photocatalyst used	% removal of Cr(VI) Only	% removal of Methylene Blue(MB) only	% simultaneous removal of Methylene blue and Cr(VI)
Graphitic carbon nitride (gC ₃ N ₄)	52.0	60.2	63.4 (MB) 68.6 (Cr(VI))
Sn-doped BiOCl@gC ₃ N ₄	78.7	80.3	90.1(MB) 93.5 (Cr(VI))

Acknowledgement:

The authors gratefully acknowledge the financial support of MaSIM and NWU

References:

[1] T.O.Ajiboye , O.A.Oyewo ,D.C.Onwudiwe, *Chemosphere*, **2021**,262, 128379