PRODUCTION & CHARACTERIZATION OF EXPANDED GRAPHITE USING MICROWAVE RADIATION AND ITS APPLICATION

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BONAFIDE CERTIFICATE

"Certified that this project report entitled"
PRODUCTION & CHARACTERIZATION OF EXPANDED GRAPHITE USING MICROWAVE RADIATION AND ITS APPLICATION
" is a Bonafide work of **our team** who carried out the Project work under my supervision and guidance".

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ABSTRACT

Recently, organic contaminants from textile and dye industry have adversely affected on human's health and living things. Hence, the development of effective contaminated water treatment is one of the most crucial tasks. Expanded Graphite (EG) has been considered as efficient platforms to remove of organic dyes from aqueous solution due to its excellent performance. The main objective of the present work is to investigate adsorption behaviour of methylene blue (MB) and Congo Red (CO) on exfoliated graphite fabricated using flake graphite from Yen Bai province.

ACKNOWLEDGEMENT

We wish to express our sincere thanks and deep sense of gratitude to our project guide, Dr. Gargi Raina, Professor, School of Electronics Engineering, for her consistent encouragement and valuable guidance offered to us in a pleasant manner throughout the course of the project work.

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for their support and their wisdom imparted to us throughout the course.

We thank our parents, family, and friends for bearing with us throughout the course of our project and for the opportunity they provided us in undergoing this course in such a prestigious institution.

RAJAL

K TEJA NAIDU

JACOB JEBARAJ

PAVAN

MANIKANTA

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INTRODUCTION:

OBJECTIVES:

- Recently, Vietnam has faced increasing water pollution due to waste streams from the processing and consumption of organic dyes in the textile industry. The massive discharge of untreated organic dyes is detrimental to aquatic life and human health (Roy, Chakraborty, Kundu, Adhikari, & Majumder, Roy, A., Chakraborty, S., Kundu, S. P., Adhikari, B., & Majumder, S. B. (2012).

- Adsorption of anionic-azo dye from aqueous solution by lignocellulose-biomass jute fibre: Equilibrium, kinetics, and thermodynamics study. Industrial & Engineering Chemistry Research, 51(37), 12095–12106. doi:10.1021/ie301708e. The existence of highly organic dye compounds in hydrosphere results in considerable increase in chemical oxygen demand, limitation of light penetration into the water, undesirable interference in photosynthesis of hydrophyte and prevention of growth of microbes in the aquatic ecosystem

- In addition, the selective toxicity of organic dyes is carcinogen and mutagen (Arami, Limaee, Mahmoodi, & Tabrizi, 2005 Arami, Limaee, Y. Mahmoodi, N. M., & Tabrizi, N. S. (2005). Removal of dyes from coloured textile wastewater by orange peel adsorbent:

Equilibrium and kinetic studies. Journal of Colloid and Interface Science, 288(2), 371–376. doi: 10.1016/j.jcis.2005.03.020. There have been a variety of physical and chemical treatment method available for the treatment of coloured effluents, namely adsorption, coagulation, flocculation, ozonation, membrane filtration, ion exchange and chemical precipitation (Aramid et al., 2005Arami, M., Limaee, N. Y., Mahmoodi, N. M., & Tabrizi, N. S. (2005). Removal of dyes from coloured textile wastewater by orange peel adsorbent: Equilibrium and kinetic studies. Journal of Colloid and Interface Science, 288(2), 371–376. doi: 10.1016/j.jcis.2005.03.020 Avetta, Sagerman, Lopez-Manchanda, & Calza, 2015 Avetta, P., Sagerman, M., Lopez- Manchanda, M., & Calza, P. (2015). Use of graphite oxide and/or thermally reduced graphite oxide for the removal of dyes from water. Journal of Photochemistry and Photobiology A: Chemistry,312,

- 88–95.doi: 10.1016/j.jphotochem.2015.07.015

BENEFITS:

Home Automation industry is growing rapidly; this is fuelled by provide supporting systems for the elderly and the disabled, especially those who live alone. Coupled with this, the world population is confirmed to be getting older. Home automation systems must comply with the household standards and convenience of usage. This project details the overall design of a wireless home automation system (WHAS) which has been built and implemented. The automation centres on the microcontroller MSP430 and uses low-power RF wireless communication modules which are relatively cheap. The home automation system is intended to control all lights and electrical appliances in a home or office. The system has been tested and verified.

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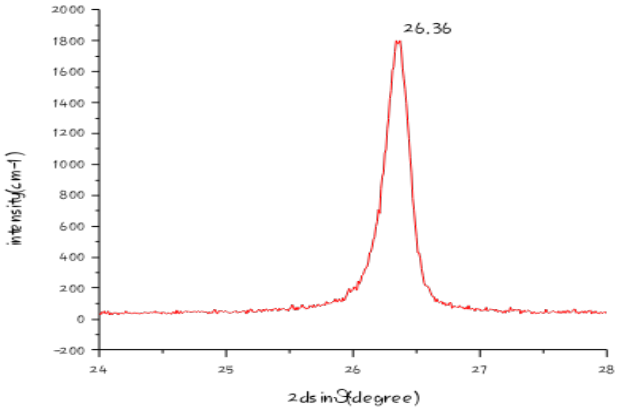
CONTENT AND PROCEDURE:

Step1:

Expanded Graphite: 1g of Graphite in 10.62 ml of Conc. Ammonium hydroxide



For 1 minute

we will get the value of

d=0.036nm

and c=o.672nm

For expanded Graphite:

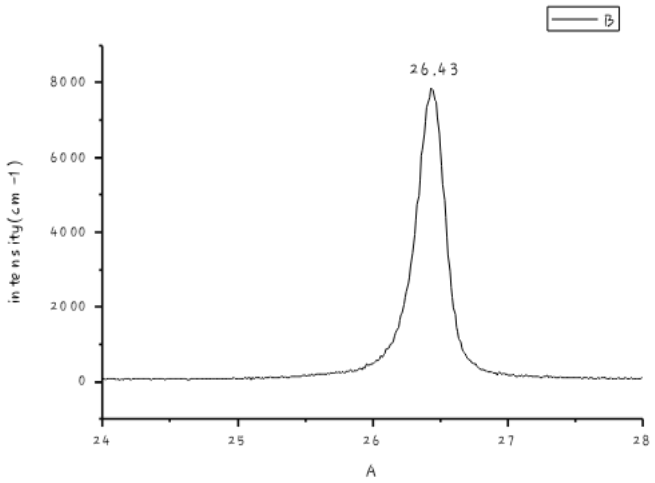
d- spacing: 0.3377nm

C=0.6754nm

Expansion: 0.49%

Step 2:

Expanded Graphite: 1g of Graphite in 10.62 ml of Conc. Ammonium hydroxide



For 2 minutes

we will get the value of Graphite:

d- spacing: 0.336nm

C=0.672nm

Expanded Graphite:

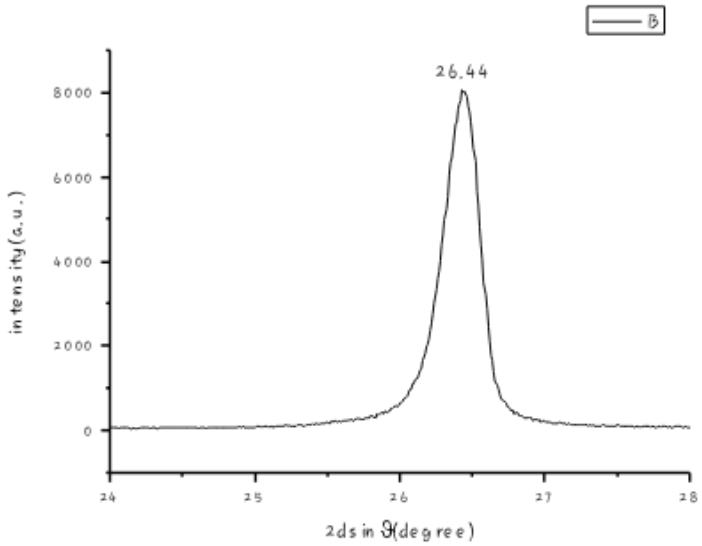
d- spacing: 0.3368nm

C=0.6736nm

Expansion: 0.2%

Step 3:

min (2.5g in 26.5ml of conc. Ammonium hydroxide)



For 3 minutes

we will get the value of Graphite:

d- spacing: 0.336nm

C=0.672nm

Expanded Graphite:

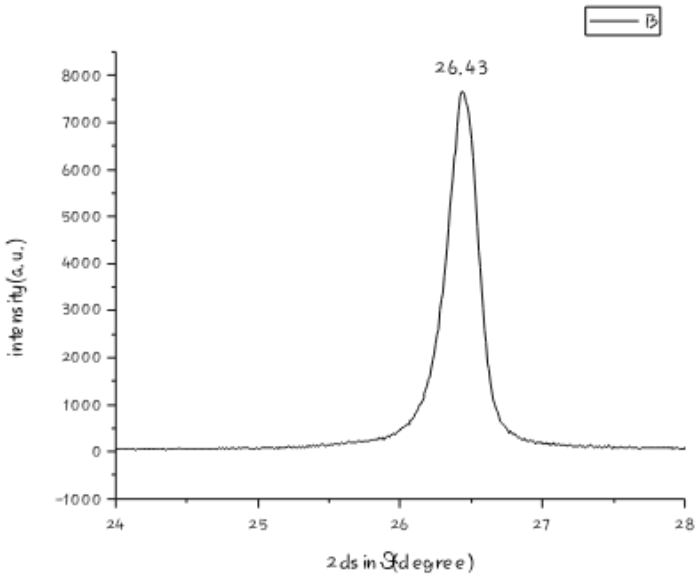
d- spacing: 0.3366nm

C=0.6732nm

Expansion: 0.18%

Step 4:

For 4 minutes

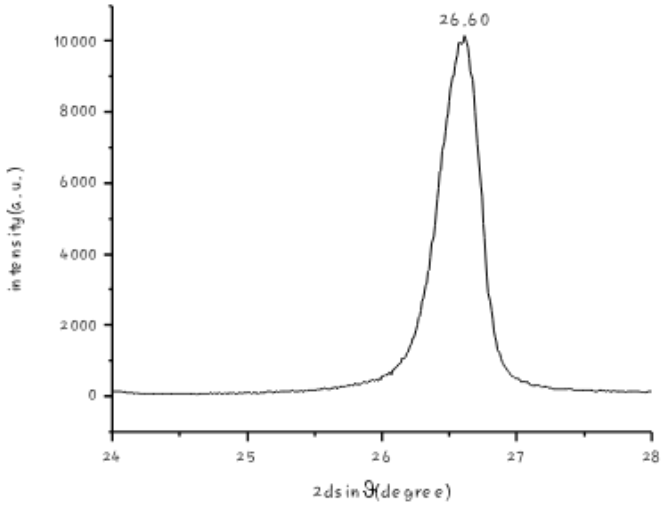


For 4 minutes:
we will get the value of _Graphite:
d- spacing: 0.336nm
C=0.672nm

Expanded Graphite:
d- spacing: 0.3368nm
C=0.6736nm
Expansion: 0.2%

Step 5:

For 6 minutes



Graphite:

d- spacing: 0.336nm
C=0.672nm

Expanded Graphite:

d- spacing: 0.3368nm
C=0.6736nm
Expansion: 0.2%
oil spills (graphene is used)

ANALYSIS:

In this experiment we check the value for 1,2,3,4,6 minutes to find expansion. At every value of minute, we will get the value from our done experiment in lab and by using the value that we received in our experiment with the help of formula

n(lambda)=2dsin(angle)

we will find the value of d here d is very useful information for in this experiment as with the value of d we will conclude our experiment.

Now by using formula d=n(lambda)/2sin(angle)
So

For 1 minute

we will get the value of
d=0.036nm
and c=o.672nm

For expanded Graphite:

d- spacing:0.3377nm
C=0.6754nm
Expansion:0.49%

For 2 minutes
we will get the value of Graphite:
d- spacing: 0.336nm
C=0.672nm

Expanded Graphite:
d- spacing: 0.3368nm
C=0.6736nm
Expansion: 0.2%

For 3 minutes
we will get the value of _Graphite:
d- spacing: 0.336nm
C=0.672nm

Expanded Graphite:
d- spacing: 0.3366nm
C=0.6732nm
Expansion: 0.18%

For 4 minutes:
we will get the value of _Graphite:
d- spacing: 0.336nm
C=0.672nm
Expanded Graphite:
d- spacing: 0.3368nm
C=0.6736nm
Expansion: 0.2%

For 6 minutes

we are not getting expansion as we can saw it in figure state
now we know that 26.49 is best degree using this as primary condition when we observe the value which we get from our experiment is during 1,2,3 and 4 minute we get expansion. Here with increasing minute the value we get our expansion near to 26.49.

so, we took the value closer to 26.49 which is at 4^{th} minute that is 26.43.

and, in 6^{th} minute we are not getting expansion

Thus,

on 4^{th} minute we are getting our graphene which is

Graphite:

d- spacing: 0.336nm
C=0.672nm

Expanded Graphite:

d- spacing: 0.3368nm
C=0.6736nm
Expansion: 0.2%

oil spills (graphene is used)

as we see in ocean a problem of oil spills. here also our graphene play a very important role .as graphene absorb the oil and thus preventing us from a great damage

CONCLUSION AND FUTURE WORK

CONCLUSION:

In summary, this study shows that MB and CO can be eliminated from aqueous solution by using EG materials fabricated via facile microwave technique. The contact time, pH value in solution, adsorbent dosage and initial concentration of dyes showed important effect on the adsorption rate for MB and CO on EG. Possessing mesoporous structure with large surface area and total pore volume, the EG shows maximum adsorption performance for dyes with removal capacities of 47.5 mg/g MB and 201.2 mg/g CO per 1 g of adsorbent at pH = 9 and EG dose of 2 g/L. It has been found that the performance of EG was degraded in reuse tests; however, the adsorption capacities are still significant within three times of using. It is suggested that further investigation is necessary to find a proper desorption approach to improve the reusability of EG. These obtained results indicate that cost-efficient graphite-based adsorbents using simple manufacturing protocols exhibited remarkable efficacy for dye removal from aqueous solution.

FUTURE WORK:

- Being flexible and thin means that graphene based photovoltaic cells could be used in clothing; to help recharge your mobile phone, or even used as retrofitted photovoltaic window screens or curtains to help power your home.
- Potential graphene applications include lightweight, thin, and flexible electric/photonics circuits, solar cells, and various medical, chemical and industrial processes enhanced or enabled by the use of new graphene materials.
- Oil spills recovery in faster and safest way

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