

Photocatalytic Activity of Mixed Matrix Membranes for Degradation of Anionic Dye in Water waste

Oladipo Gabriel ¹, Alayande Samson Oluwagbemiga ², Akinlabi Akinola Kehinde ³

¹ Department of Science Laboratory Technology, D.S Adegbenro ICT Polytechnic, Ogun State, Nigeria. ² Department of Physical Sciences, First Technical University, Ibadan, Oyo State, Nigeria. ³ Department of Chemistry, Federal University of Agriculture, Abeokuta, Ogun State, Nigeria. samson.alayande@tech-u.edu.ng

Introduction

Wastewater treatment is a major channel to achieve safe water and eliminate surface water contamination. Photocatalytic degradation has recorded huge success in the field of wastewater treatment and water purification particularly textile effluent [1] due to prompt decolourization, disinfection and microbial inhibition. However, a major challenge is photocatalyst recovery, therefore in the present study, natural crumb rubber, a natural polymer was utilised as a support for TiO_2 , Ag-TiO_2 and Ag/Zn-TiO_2 nanoparticles previously reported [2]. The nanoparticles were used for the preparation of Mixed Matrix Membranes for photocatalytic degradation of methyl orange dye under visible light.

Materials and Methods

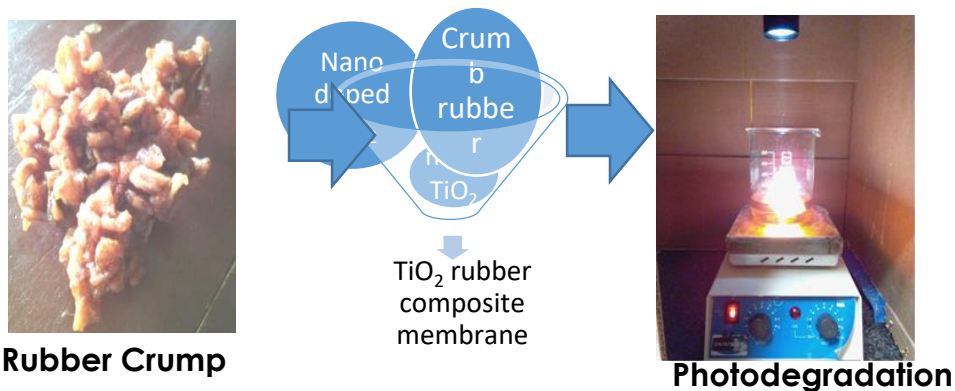
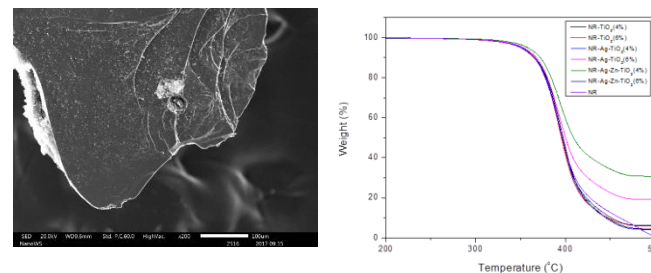


Fig. 1: SEM and TGA Analysis of Rubber Mixed Matrix Membranes

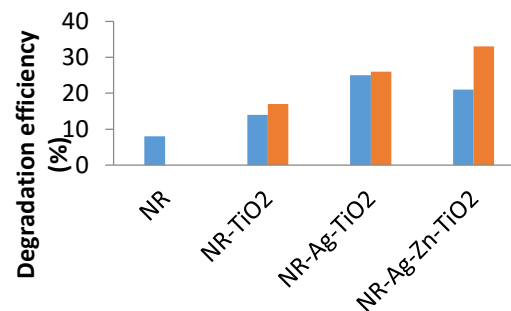


Fig. 2: Photodegradation of methyl orange dye by NR with 4 and 6% photocatalyst

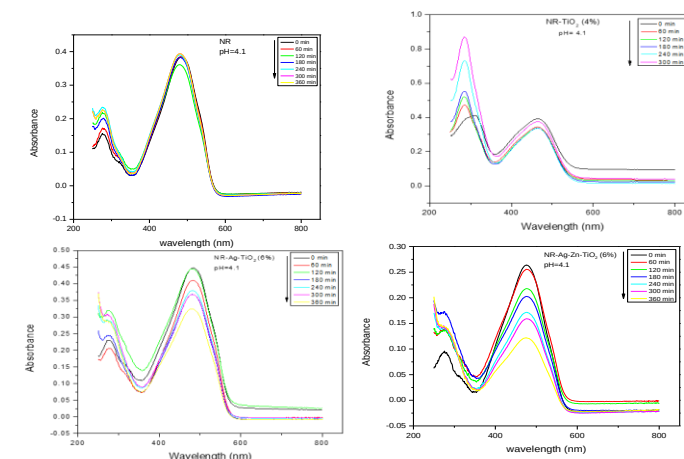


Fig. 3: UV-Vis spectra of methyl orange by NR and Composite NR

Conclusion

The highest degradation was attained with composite membrane filled with 6% Ag-Zn-TiO_2 nanoparticle. Photocatalyst recovery is presented with natural rubber.

Reference

1. Elrasheedy Asmaa, et. al. (2019) doi:10.3390/membranes9070088
2. Oladipo G. O et. al., (2019) doi.org/10.1139/cjc-2018-0308

The natural rubber (NR) was compounded with TiO_2 , Ag-TiO_2 and $\text{Ag-Zn co-doped TiO}_2$ nanoparticles.

Results and Discussion

The SEM micrograph revealed nanoparticles dispersion on the surface of the natural rubber (NR). All composite membranes showed a single stage thermal degradation.