Title: Remediation of Toxic Dye Pollutants by Using Graphene-Based Adsorbents

Author(s) name: Kshama D. Lokhande, Surajit Some*

Department of Speciality Chemicals Technology

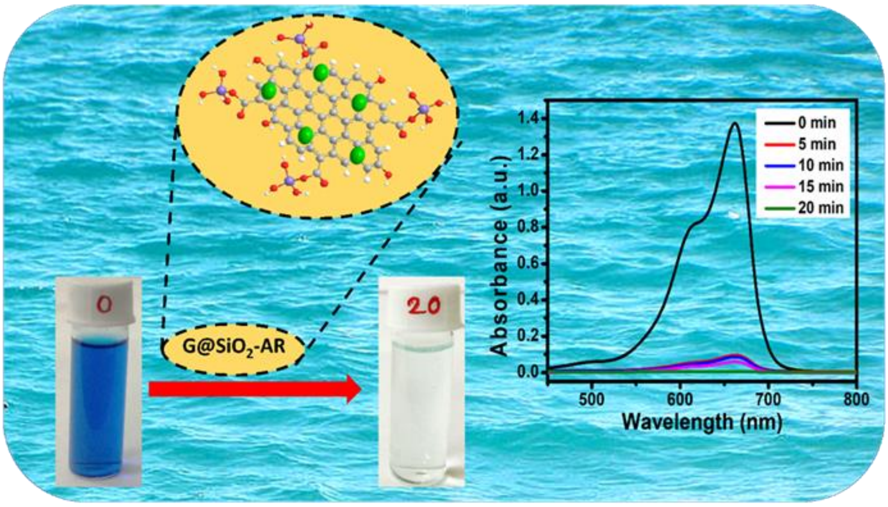
Institute of Chemical Technology

(Email: sr.some@ictmumbai.edu.in)

Abstract:

Textile dying is the major cause of water pollution devastating the environment and posing health hazards to humans. The textile industries use around 93 billion cubic meters (21 trillion gallons) of water annually. Along with finishing, dyeing is the most polluting and energy-intensive process involved in making clothes. Once dyeing and finishing are done, the cheapest way for factories to get rid of unusable, chemical-laden wastewater is to dump it into nearby rivers and lakes, which extremely pollutes the natural water bodies. To fix this threat, research and development should be focused on the preparation of dye adsorbents. Considering this concern, the present article is focused on synthesis of G@SiO_2-AR by using silica nanoparticles, which are coated with graphene and alkyd resin. The G@SiO_2-AR has been employed to remove the methylene blue (MB) from aqueous solution. G@SiO_2-AR has a strong affinity to adsorb MB as MB is a cationic dye and it is strongly attracted by anions induced by deprotonation of acid functionality on GO. The adsorption experiment has been carried out by keeping the constant adsorbent dose in 50 mL of 50 ppm dye solution with varying time intervals such as 5, 10, 15, 20 and 25 min at room temperature. We got better results at 20 min and the dye removal efficiency of G@SiO_2-AR and SiO_2@AR is 95.08 % and 87.32 % respectively at room temperature. Also, we carried out the same experiment at different temperatures ranging from 298, 308 and 318 K, out of which the highest adsorption efficiency of above-mentioned adsorbents has been observed at 318 K up to 99.72 % and 93.16 % respectively. Kinetic data has shown that the adsorption phenomenon follows the pseudo-second order kinetic model, while adsorption isotherm follows the Langmuir adsorption isotherm.

Figure/Scheme (if any):



References and Notes:

1. Lokhande, K. D.; Pethsangave, D. A.;, Kulal D. K.; Some, S. *ChemistrySelect* **2020**, *5*, 8062-8073.