Reduced graphene oxide modified luffa sponge as a biocomposite adsorbent for effective removal of cationic dyes from aqueous solution

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\textbf{ABSTRACT}

Natural luffa sponge (LS) was modified by reduced graphene oxide (RGO) by one-step hydrothermal treatment of LF in GO suspensions with the assistance of ascorbic acid. The obtained RGO-modified LF sponge (RGL) was studied by X-ray diffraction, Fourier-transform infrared, and scanning electron microscope (SEM). The results suggested that a biocomposite with about 500 nm pore diameter, which can effectively enhance the adsorption capacity properties of LS. The batch adsorption studies demonstrated that the adsorption of RGL toward cationic dyes highly depended on the initial pH of solution, RGO content and initial concentration of dyes. The incorporation of RGO can increase the adsorption capacities of LS significantly. The value of the uptake of cationic dyes at equilibrium time ($q_e$), for basic magenta (BM), increased from 32.56 to 88.32 mg/g, while for methylene blue (MB), increased from 31.65 to 63.32 mg/g, when the content of RGO increased from 0 to 0.4 wt%. It was found that the adsorption kinetics data fitted with pseudo-second-order model and adsorption isotherm followed the Langmuir model well. The electrostatic interaction played a major role in the adsorption process.

\textbf{Keywords:} Reduced graphene oxide; Luffa sponge; Cationic dye; Kinetics; Isotherm

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