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Three dimensional reduced graphene oxide/ZIF-67 aerogel: effective removal cationic and anionic dyes from water

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A three dimensional (3D) reduced graphene oxide (rGO)/zeolitic imidazolate framework-67(ZIF-67) aerogel (3D rGO/ZIF-67 aerogel) was prepared via in situ assembly of ZIF-67 polyhedrons on a 3D rGO networks, not only providing multifarious affinity interactions for synergistic promoting the adsorption behavior of organic dyes, but also constructing a holder for ZIF-67 polyhedrons to convenient separation. This porous aerogel displays excellent absorption ability for cationic dyes (crystal violet, CV) and anionic dyes (methyl orange, MO). The maximum adsorption capacities are up to 1714.2 $mg \cdot g^{-1}$ and 426.3 $mg \cdot g^{-1}$ for CV and MO, respectively. 3D rGO/ZIF-67 aerogel shows a remarkable promoting of CV adsorption capacity than pure 3D rGO and ZIF-67. The ultrahigh adsorption capability towards cationic CV dyes is mainly driven by π-π interactions and electrostatic interactions between 3D rGO/ZIF-67 aerogel and dye molecules, and synergistic interactions at the interface of 3D rGO and ZIF-67 polyhedrons. The high adsorption capability towards anionic MO dyes is mainly due to the porosity of ZIF-67 polyhedrons and electrostatic attraction between MO and ZIF-67. The multi-component property of 3D rGO/ZIF-67 aerogel