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## Bi-Functional Eco-friendly 3D Scaffolds based on N-acyl Thiolated Chitosan for Potential Adsorption of Dye Pollutants and Antibacterial Applications

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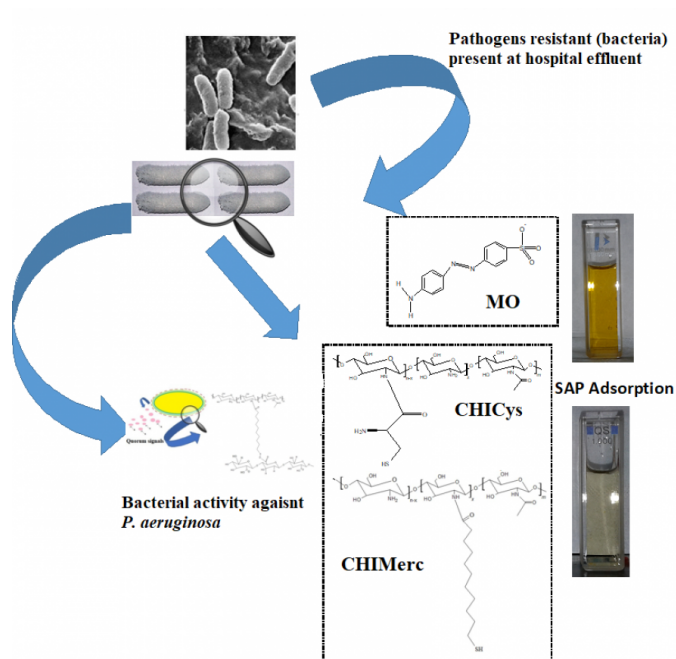
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### PURPOSE OF THE ABSTRACT

The presence of organic dyes in industrial effluents may result in the formation of toxic sludge and/or carcinogenic compounds, with the consequent impact on water resources. To worsen this scenario, the proliferation of multidrug-resistant microorganisms in waters caused by anthropogenic activities and natural disasters has become a major global concern because of serious health and environmental harms. Herein we designed and developed novel three-dimensional (3D) porous scaffolds made of N-acyl thiolated chitosan using 11-mercaptopundecanoic acid. These hydrogels exhibited 3D hierarchical pore structure (porosity > 82%) and surface area (7 m<sup>2</sup>.g<sup>-1</sup>), and demonstrated high adsorption capacity for methyl orange anionic dye pollutant (~450 mg.g<sup>-1</sup>) in water. The adsorption data were well-fitted to a pseudo-second-order kinetics and Freundlich's isotherm. Moreover, the thiolated-chitosan proved antibacterial activity against *Pseudomonas aeruginosa* regularly found in hospital discharges. Thus, for the first time, bi-functional thiolated-chitosan 3D-scaffolds were produced by combining green bio-sorbent behavior for organic dyes and antimicrobial activity against pathogenic bacteria, which offers an innovative strategy for the treatment of multi-polluted and contaminated water bodies.

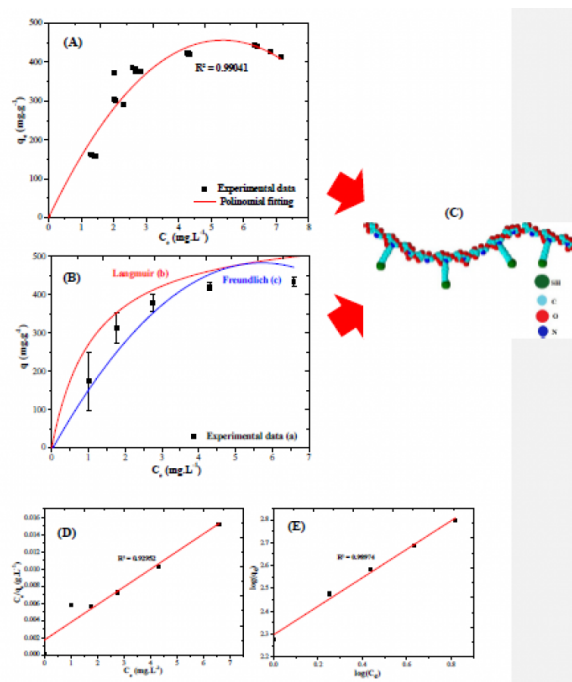
## FIGURES



**FIGURE 1**

Graphical abstract

Green Chemistry meets Environmental Science and Technology: Novel 3D Porous Scaffolds based on Bi-functional Chitosan Thiomers, as Bio-sorbents and with Antibacterial Activity for Wastewater Treatment



**FIGURE 2**

Adsorption Isotherms

Fitting of models to MO-CHIMerc experimental data (A) second-order degree polynomial, (B) Langmuir (b, red line) and Freundlich (c, blue line) adsorption isotherms (C) 3D structure of CHIMerc showing the thiol group at chitosan chain (SH green). (D) Linea

## KEYWORDS

Bio-sorbent | Antibacterial Hydrogel | Thiolated-chitosan | Wastewater Treatment

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