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Materials and product engineering

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ABSTRACT

In this article, morphology, structure and size controllable chitosan microspheres with high mechanical strength were synthesized by microfluidic technology combining chemical crosslinking and used as an adsorbent for methyl orange. The synthesized adsorbents were characterized using scanning electron microscopy (SEM), Fourier transform infrared spectroscopy (FTIR), Energy Dispersive Spectrometer (EDS). The effect of pH revealed that the adsorption process depended on pH and the pH variation of methyl orange solution after adsorption indicated that adsorption capacity was affected through the associated role of chitosan nature and pH variation. Experimental results suggested that the as-prepared chitosan microspheres were controlled within a narrow size distribution (coefficients of variation is 1.81%), whose adsorption capacity reached to 207 $mg \cdot g^{-1}$ and mechanical strength was suitable to resist forces. In addition, the adsorption isotherm was well fitted with the Langmuir model, and the adsorption kinetic was best described by the pseudo-second-order kinetic model. The high performance microfluidic-synthesized chitosan microspheres have promising potentials in the applications of removing dyes from wastewater.

Keywords: Microfluidic technology, chitosan microspheres, adsorption, methyl orange

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