Quaternized chitosan-intercalated montmorillonite composite for cyanobacterial bloom inhibition

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\textbf{ABSTRACT}

A composite based on quaternized chitosan and montmorillonite was developed as an environment-friendly algaecide for emergency management of harmful algae bloom. The composites were prepared via the ultrasonic intercalation solution method. X-ray diffraction (XRD), Fourier transformed infrared spectroscopy (FTIR), differential scanning calorimetry–thermogravimetry analysis (DSG/TG) and high-resolution transmission electron microscopy (HRTEM) were used to characterize the composite. The quaternized chitosan was intercalated into the interlayer of montmorillonite, leading to a greater disorder degree of montmorillonite lamella, and the mass fraction of intercalation was approximately 20.6%. Quaternized chitosan intercalated montmorillonite effectively removed \textit{Oscillatoria} by the deposition netting and electrostatic neutralization mechanism and cleared up the cyanobacterial bloom in natural landscape water body within 48 h. Quaternized chitosan, the effective algicide in the interlayer of montmorillonite, released slowly, inhibited the activity of \textit{Oscillatoria} in the long term, and effectively prevented the resuspension of algae aggregates.

\textbf{Keywords:} Intercalated montmorillonite; Quaternized chitosan; \textit{Oscillatoria}; Harmful algae bloom inhibition

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