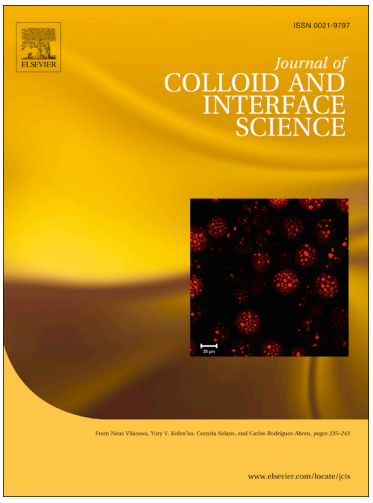

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Enhanced demulsification from aqueous media by using magnetic chitosan-based flocculant

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Abstract: A series of quaternized chitosan (QC)-grafted magnetic nanoparticles (MNPs) were successfully synthesized for demulsification from aqueous environments. Fe_3O_4 MNPs were synthesized by using a coprecipitation method, followed by surface coating with silica and aminopropyl to form a surface for further grafting of QC molecular chains. The synthetic magnetic flocculants were characterized by various technologies and their demulsification performances were evaluated in detail as a function of dosage, QC grafting ratio (G_q), pH and magnetic field. Results showed that pH did not significantly affect oil-water separation performance and MNPs with high G_q exhibited enhanced separation efficiency. The separation capacity was estimated to be >105 mg of diesel oil/mg of magnetic flocculant. Recycling experiment indicated the magnetic flocculant could be recycled up to at least 7 cycles at various pH levels. The grafted QC layer endowed the hybrid MNPs with permanent positive surface charges, thus allowing them to flocculate negatively charged oil droplets via electrostatic patching. The magnetic field could not only accelerate the separation of resulting flocs, but also remove the MNPs-coated dispersed oil droplets. In conclusion, QC-grafted