

The modified sol-gel process using $\text{Fe}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$ as a precursor. Nucleation sites for the iron oxide were generated at the CNM surface due to the electrostatic interaction between Fe (III) ions and the carboxylate surface groups of acid-treated CNMs. The occurrence of gelation was inhibited by the addition of the NaDDBS surfactant. The surfactant interfered in the growth stage of the iron oxide nanoparticles through to the coordination of the NaDDBS molecules to the iron (III) centers due to the attraction between the negatively-charged hydrophilic head of the surfactant and the positively-charged iron.

