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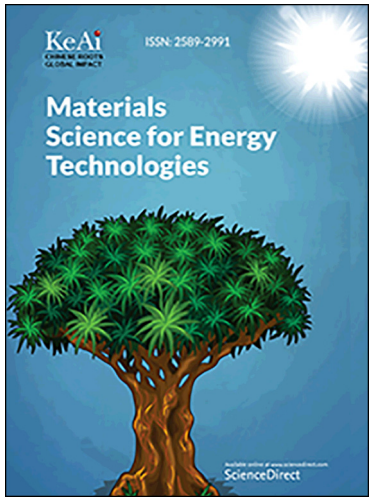

Nanoparticles of oxidized-cellulose synthesized by green method

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Nanoparticles of oxidized-cellulose synthesized by green method

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ABSTRACT: Site specific drug delivery is the foremost requisite for chemotherapy to avoid the associated side effects. For this, stimuli-responsiveness of the drug delivery device is of great interest to selectively release the loaded drug to the tumor cells. Herein, the oxidized cellulose nanoparticles (OCNPs) were synthesized by oxidation of cellulose with 2,2,6,6-tetramethylpiperidine-1-oxyl radical (TEMPO) and sodium periodate followed by sonication. Doxorubicin (Dox), as model anticancer drug, was loaded on the synthesized OCNPs via pH-responsive linkages between functional groups of Dox and OCNPs. Its release behaviour was studied in medium of different pH values. Dox release was maximum at pH 5.0 and pH 6.8 i.e., endosomal and extracellular pH, respectively in tumor tissue, and minimum at physiological pH 7.4 of normal tissues. Various mathematical models were applied to elucidate the release mechanism of the Dox from the loaded OCNPs. Dox release followed non-Fickian diffusion mechanism. The results suggest that these pH-responsive OCNPs are effective and promising Dox-delivery carriers for cancer treatment and capable of reducing side-effects of this anticancer drug to the normal cells.

Key words: Green synthesis; Oxidized-cellulose nanoparticles; Site specific drug delivery; non-Fickian diffusion