

عنوان مقاله:

Eco-friendly synthesis of surface grafted Carbon nanotubes from sugarcane cubes for development of prolonged release drug delivery platform

محل انتشار:

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خلاصه مقاله:

Surface grafting of nanocarriers could modulate their properties and characteristics. As carbon nanotubes synthesis is a very tricky process and requires high-end methods, hence the present investigation was aimed to develop an eco-friendly method for synthesis carbon nanotubes (CNTs) and subsequent surface grafting for enhanced drug delivery application. The present study elaborates two-step chemical modifications; wherein the first step is catalytic cleavage of natural precursor in the presence of ferrocene and the second step involve chemical grafting of Acyclovir (ACV) as a model drug to understand the drug release behaviour. The catalytic cleavage of sugarcane cubes (natural precursor) was carried out in a closed copper tube, which prevents oxidation and results in a conversion of tubular nanostructures to amorphous carbon. The covalent attachment of ACV on purified CNTs (fCNTs) was done using carbodiimide chemistry. The preliminary Uv-Vis absorbance spectra defined at 260 nm was arised due to $\pi-\pi^*$ stacking of aromatic C-C bonds. The Fourier Transforms Infrared Spectroscopy (FTIR) indicated the hydroxyl stretch at 3300 cm^{-1} while amide I bond formation was observed at 1672 cm^{-1} . The XRD spectra confirmed successful synthesis of CNTs. The calculated average crystallite size (Scherer equation) of synthesized CNTs was found to be 42.84 and 44.45 nm; it was also in accordance with the morphological observation as confirmed simultaneously using SEM analysis. The covalently attached ACV was released up to 80% during 8h of in vitro drug release study. The surface grafting potential of CNTs was found to be promising compared to other nanomaterials

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