Functionalized carbon nano-scale drug delivery systems from biowaste sago bark for cancer cell imaging

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ABSTRACT

Background: Nano-scale carbon systems are emerging alternatives in drug delivery and bioimaging applications of which they gradually replace the quantum dots characterized by toxic heavy metal content in the latter application. Objective: The work intended to use carbon nanospheres synthesized from biowaste Sago bark for cancer cell imaging applications. Methods: This study synthesised carbon nanospheres from biowaste Sago bark using a catalyst-free pyrolysis technique. The nanospheres were functionalized with fluorescent dye coumarin-6 for cell imaging. Fluorescent nanosytems were characterized by field emission scanning electron microscopy-energy dispersive X ray, photon correlation spectroscopy and fourier transform infrared spectroscopy techniques. Results: The average size of carbon nanospheres ranged between 30 and 40 nm with zeta potential of -26.8 ± 1.87 mV. The percentage viability of cancer cells on exposure to nanospheres varied from 91- 89 % for N2a cells and 90-85 % for A-375 cells respectively. Speedy uptake of the fluorescent nanospheres in both N2a and A-375 cells was observed within two hours of exposure. Conclusion: Novel fluorescent carbon nanosystem design following waste-to-wealth approach exhibited promising potential in cancer cell imaging applications.

KEYWORDS

Bioimaging; Catalyst-free pyrolysis; Cytotoxicity; Nano-scale carbon systems; Sago bark; Spectroscopy

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