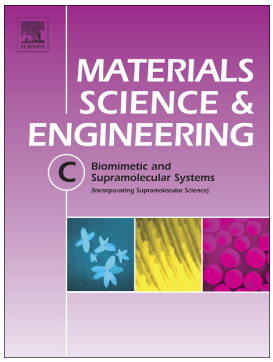

Novel Ag-carried CMC/functional copolymer/ODA-Mt wLED-treated NC and their responses to brain cancer cells

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Novel Ag-carried CMC/Functional Copolymer/ODA-Mt wLED-treated NC and their responses to brain Cancer Cells

Zakir M. O. Rzayev[1*], Ulviye Bunyatova[2, 3], Jonathan F. Lovell[4], Weipeng Shen[4], Tim Thomay[3], Alexander Cartwright[3] their **response to MIAPaCa-2 and U87 brain cancer cell lines**

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Abstract

The subject of this work is synthesis and characterization of novel multifunctional nanocomposite (8/2A-NC) consisting (1) carboxymethyl cellulose (CMC) as a matrix biopolymer and poly (maleic acid-*alt*-acrylic acid) as a reactive synthetic partner matrix polymer; (2) octadecyl amine montmorillonite (ODA-MMT) reactive organoclay provide intercalated silicate layers structures and aqueous colloidal dispersing medium, and MMT as carriers and targeting agents for anticancer agents in drug delivery systems, respectively. ODA as a intercalated surfactant finely dispersed 8/2A NC and its compatibility with matrix polymers via the interfacial polarization (complexing) and functionalization of matrix polymers by amine (ODA) and carboxylic acids from both the CMC and copolymer; (3) silver nanoparticles (AgNPs) as *in-situ* generated onto matrix polymers with unique nano-size and morphology parameters was synthesized. Important material science and bioengineering aspects of these investigations included (a) novel approach in synthetic pathways; (b) effects of physical and chemical structural rearrangements; (c) effects of Light Emitting Dioda (LED)-treatment on the FT-IR spectra, XRD reflection parameters, SEM-TEM morphology and nano-size and diameter distribution of AgNPs onto matrix polymers; (d) positive effect of LED-treatment of 8/2A nanocomposite and its response to the MIAPaCa-2 and U87 human brain cancer cell lines were evaluated. Novel 8/2A-NC multifunctional drug consisting unique positive, intercalating and encapsulated core-shell morphology structures, nano-size (5.6 nm) and narrow diameter distribution (94 %) of AgNPs onto matrix polymers [(silver NPs (0.25 %) in 8/2A NC (25 %)] with highest volume of contact area compared with used cancer micro-cells show lowest cell viability as an excellent anticancer platform. 8/2A-NC is a novel multifunctional drug with intercalating and encapsulated core-shell morphology structures consisting of positively charged, non-randomly distributed AgNPs with a large contact area and low diameters (5-6 nm). The anticancer properties of (This factor is not conformed experimentally in work) this drug can be explained by the following structural factors: 8/2A-NC contains a combination of active sites from protonated hydroxyl, carboxyl and amine groups; Ag^{+}-cations and ODA-MMT with high physical and chemical surface areas. We suggest this material be further explored for anti-cancer testing.

Keywords: CMC matrix, Functional Copolymer, Ag-NPs, DNA, MIAPaCa II, U-87, Cancer Cells

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