Abstract

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Highly ordered functionalized mesoporous silicate nanoparticles reinforced poly (lactic acid) gatekeeper surface for infection treatment

The controlled release of a drug considers the key feature of the delivery carrier that enhances therapeutic efficacy. This study was aimed at design, synthesis of nano valve and capping systems onto caged functionalized mesoporous silica nanoparticles (SBA15) with nanoflowers polylactic acid (PLA-NF). Levofloxacin (LVX) as a specific model drug was encapsulated onto series SBA15, SBA15@NH2, and SBA15@NH2/PLA. The examined nanocarriers released in a controlled fashion by external stimuli. The delivery vehicle based on PLA-NF coated SBA15@NH2, potent conjugated with LVX with experienced a high extent of trapping content with fast releasing by pH regulating mechanism. In vial LVX released profile and in vitro antifungal forceful of the Selected microbes were detected. However, SBA15@NH2/PLA exhibited pore size, surface area and pore volume 5.4 nm, 163 and 0.011 respectively, but the significantly clear zone was obtained with Staphylococcus aureus ATCC 6538 (G+ve), Escherichia coli ATCC 25922 (G-ve), Candida albicans ATCC 10231 (yeast) and Aspergillus niger NRRL A-326 (fungus). Viability test avouch that rising functionality enhanced cytocompatibility and non-toxicity profile. Based on the aforementioned promising data, this type of nanocarriers offers when functionalized with targeting cells, the accessibility to deliver antibiotics onto nanosystem for increased potency against microbes and reduce side effects.