

عنوان مقاله:

Synthesis of magnetite-silica-carbon quantum dot nanocomposites for melatonin drug delivery

محل انتشار:

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خلاصه مقاله:

In targeted drug delivery, the drug is released at a specific and desired point and condition. In this research, magnetite cores (high saturation magnetization property (emu.g^{-1} ۱۵۹) were used to target the drug system. First, magnetite nanoparticles were synthesized by coprecipitation method from divalent and trivalent chloride salts of iron (FeCl_2 and FeCl_3), then mesoporous silicas (with a pore diameter of ۱۳ nm) were formed by Stöber's method from the tetraethylorthosilicate (TEOS) silica source on magnetite cores in spheres form. After that, the carbon quantum dots were synthesized by hydrothermal method from citric acid and their surface was immobilized by dimethylamine which were placed in silica cavities by physical adsorption method. The effective drug melatonin (۶.۴۶ mg of melatonin per ۱۰۰ mg of the drug system) was also loaded on this system by physical absorption method and the release of this drug was carefully determined by the release from the dialysis bag in the simulated environment of blood and cancer tissue. the quantum gain of the system was determined to be about ۴۰%. The results showed that the loading of melatonin drug and carbon quantum dots was done well on silica nanoparticles with magnetite cores, and this system releases ۳۰% of the drug even under temperature conditions. In targeted drug delivery, the drug is released at a specific and desired point and condition. In this research, magnetite cores (high saturation magnetization property (emu.g^{-1} ۱۵۹) were used to target the drug system. First, magnetite nanoparticles were synthesized by coprecipitation method from divalent and trivalent chloride salts of iron (FeCl_2 and FeCl_3), then mesoporous silicas (with a pore diameter of ۱۳ nm) were formed by Stöber's method from the tetraethylorthosilicate (TEOS) silica source on magnetite cores in spheres form. After that, the carbon quantum dots were synthesized by hydrothermal method from citric acid and their surface was immobilized by dimethylamine which were placed in silica cavities by physical adsorption method. The effective drug melatonin (۶.۴۶ mg of melatonin per ۱۰۰ mg of the drug system) was also loaded on this system by physical absorption method and the release of this drug was carefully determined by the release from the dialysis bag in the simulated environment of blood and cancer tissue. the quantum gain of the system was determined to be about ۴۰%. The results showed that the loading of melatonin drug and carbon quantum dots was done well on silica nanoparticles ... with magnetite cores, and this system releases ۳۰% of the drug

کلمات کلیدی:

Melatonin, Silica, Magnetic particles, Drug delivery, Synthesis

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