Poster

Synthesis and Characterization of a Gallic Acid Metal Organic Framework for Antitumoral Therapy

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ABSTRACT

Motivation: Nano-Metal Organic Frameworks (n-MOFs) are emerging as promising drug delivery systems in biomedical applications owing to their composition versatility and high porosity [1] The aim of our work was to synthetize an n-MOF comprising Gallic acid (GA), as organic ligand, and Fe III, as coordination cation. The election of the n-MOF components obeys to their physiological properties. Specifically, GA is a natural product belonging to the family of polyphenols, which exert a wide range of biological activities, such as antioxidant and pro-apoptotic activities that may be applied in tumor prevention [2] and antitumoral therapy [3,4], respectively.

Methods: The n-MOF comprising GA and Fe(III), GalFe, has been synthetized under gentle conditions (room temperature and aqueous medium) and characterized by UV-Vis spectrometry, FTIR spectroscopy, DLS and electron microscopy. Studies of entrapment efficiency and release profile were performed using a fluorescent marker (rhodamine 6G; R6G) as model cargo.

Results: GalFe nanoparticles are spherical, with a mean hydrodynamic diameter of 270 nm and a zeta potential of -22 mV. The FTIR spectrum of GalFe is similar to that of nano-MOF MIL-53, which comprises terephthalic acid and Fe (III), and the characteristic bands of GA are clearly observable in the spectrum. GalFe nanoparticles are stable in water over a wide range of pHs (from pH 4 to 9). At low pH (1-3), nevertheless, most of the hydroxyl groups are protonated, which led to a rapid destabilization and disassembly [5]. The entrapment efficiency of R6G is extremely high (99.9%), and the nanoparticles do not release their cargo after 24 hours of dialysis against water.

Conclusions: We have synthetized and characterized an n-MOFS that contains gallic acid as organic ligand. Pro-apoptotic properties of gallic acid convert this new nanomaterial into a promising candidate in antitumoral therapy. An additional layer of complexity was introduced by encapsulating a water-soluble fluorescent marker, giving access to imaging and therapeutic applications.

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