Development of bio-MOFs as drug delivery systems for cancer treatment

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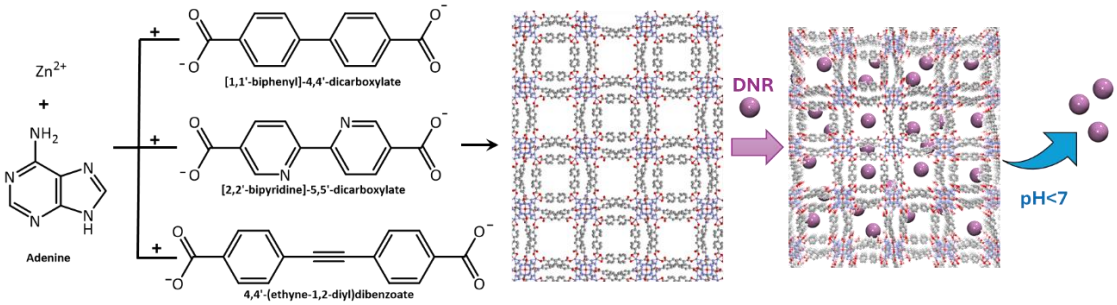
The need for highly targeted cancer therapies has led to the development of biological Metal-Organic Frameworks (bio-MOFs) as promising drug delivery systems. These frameworks are ideal carriers for anticancer agents due to their biocompatible components (metal ions and organic linkers), and structural advantages including large cavities and functionalized frameworks. These features enable the precise encapsulation and controlled delivery of therapeutic drugs directly to cancer cells while minimizing side effects. The purpose of this work is the development of bio-MOFs and the evaluation of their efficacy as drug delivery systems for cancer treatment. We synthesized both well-known bio-MOFs (such as Bio-MOF-1 [1], nano-Bio-MOF-1 [2], and Bio-MOF-100 [3]) and novel bio-MOFs with innovative linkers, including 2,2'-Bipyridine-5,5'-dicarboxylic acid and 4,4'-(Ethyne-1,2-diyl)dibenzoic acid (Scheme). All materials were thoroughly characterized by combination of PXRD, FT-IR, TGA, SEM, EDS, NMR and porosimetry. Daunorubicin (DNR) was used as model drug for encapsulation, and its release was studied under varying pH conditions simulating healthy and tumor environments.



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