

# Drug delivery of diclofenac sodium by Zn(II)-based BioMOF

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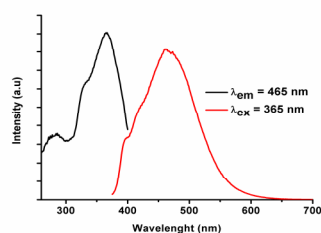
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## INTRODUCTION

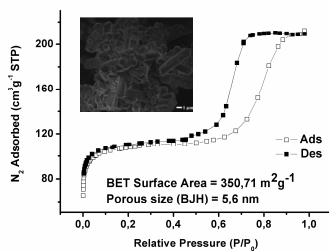
Bio-MOFs are low toxicity materials constructed by biologically compatible and renewable components such nucleobases<sup>1</sup>. This work describes the synthesis of the biocompatible **BioMOF-1** ( $C_{15}H_{18}N_3O_5Zn$ ) (**1**) constructed using Zn(II) ions, the biomolecule adenine and 4,4'-biphenyldicarboxylate linker. The compound shows permanent porosity and intense green luminescence. The encapsulation and release of diclofenac sodium, a very usual non-steroidal anti-inflammatory drug with a short half-life *in vivo* (1-2 h), in PBS buffer was also studied.

## RESULTS AND DISCUSSION

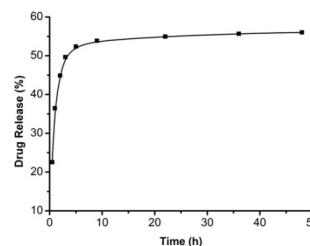
As shown in Figure 1 (red line), the compound exhibits a broadband visible luminescence from a ligand-to-metal charge transfer (LMCT) excited state<sup>2</sup>. Nitrogen adsorption studies yielded a typical type-IV isotherm of a mesoporous material (Figure 2). Concerning the drug loading studies, after 4 days of contact between **1** and diclofenac sodium in water, the obtained dispersion was centrifuged and the adsorbed amounts of the drug was indirectly determined in the supernatant using Beer-Lambert law. The results revealed that **1** loaded 1.72 mg of diclofenac by milligram of the coordination solid. The release profile of diclofenac from **1** was studied in PBS buffer pH 7.4. The Figure 3 shows that steady diclofenac release was observed over the course of 5 hours and can be attributed to the physically adsorbed drug molecules in the porous of the material. In fact the MOF released only 56% of the drug after 48 hours (see Figure 3), suggesting the existence of stronger (possibly coordination bonds) adsorbate-adsorbent interactions through which the drug molecules are strongly retained by the framework.



**Figure 1.** Solid-state photoluminescence spectra of **1**.



**Figure 2.** Nitrogen adsorption isotherm and SEM-FEG images of **1**.



**Figure 3.** Release profile of diclofenac sodium from **1**.

## CONCLUSIONS

The luminescent and porosity properties of **1** were investigated in this work. The zinc adeninate MOF exhibited very high loading capacity (1.72 mg.g<sup>-1</sup>) and satisfactory release capability (around 56%) for diclofenac sodium with a delivery time of about two days.

## REFERENCES

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2. Cui, Y.; Yue, Y.; Qian, G.; Chen, B. *Chem. Rev.* **2012**, *112*, 1126.