**Supporting Information for**

**Encapsulation of Ln$^{3+}$ hydrate species for tunable luminescent materials based on a porous Cd(II)-MOF**

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**Fig. S1** The H$_2$O and MeOH guest molecules in 1 are hydrogen bonded to the framework through O-H···O, O-H···N and N-H···O bonds.
**Fig. S2** Perspective and side views of a single channel in 1. The cavities in 1 are embedded with heteroatoms such as N and O. The opposite O⋯O and N⋯N contacts in the channel are ca. 9-11 Å. Thus the cavity in 1 perfectly matches the lanthanide hydrate Ln(H₂O)₈³⁺ and is able to bind it through O-H⋯E (E = O and N) hydrogen bonding interactions. The crystallographic size of Ln(H₂O)₈³⁺ (Ln = Eu and Tb) is about 2.80 Å³.¹

**Fig. S3** The Cd²⁺ amount found in 1 is 18.00 % based on ICP measurement.
**Fig. S4** Left: The encapsulated amount of Tb$^{3+}$ in 1b is up to 15.37 % based on ICP measurement. Right: Excitation spectrum of 1b.

**Fig. S5** Left: The encapsulated amount of Eu$^{3+}$ in 1c is up to 9.39 % based on ICP measurement. Right: Excitation spectrum of 1c.
Fig. S6 Up: The encapsulated amounts of Eu\(^{3+}\) and Tb\(^{3+}\) in 1d are 3.20 and 1.80 \%, respectively, based on ICP measurement. Bottom: Excitation spectrum of 1d.
**Fig. S7** Up: The encapsulated amounts of Tb$^{3+}$ and Eu$^{3+}$ in 1e are 1.52 and 8.92 %, respectively, based on ICP measurement. Bottom: Excitation spectrum of 1e.
Fig. S8 Up: The encapsulated amounts of Tb$^{3+}$ and Eu$^{3+}$ in 1f are 0.47 and 0.63 %, respectively, based on ICP measurement. Bottom: Excitation spectrum of 1f.

References