Guest inducing $p$-sulfonatocalix[4]arene into three dimensional capsule architecture and mixed A-B double layer framework

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**Fig. S1** Schematic representation of the bi-layer structure of *p*-sulfonatocalix[4]arene.

**Fig. S2** The coordination environment of Tb$^{3+}$. 
Fig. S3 Capsule structure of compound 2

Fig. S4 Host-guest interactions in compound 1 and 2.
**Fig. S5** The asymmetric unit of compound 3.

**Fig. S6** Crystal packing structure of compound 3 (viewed down the $a$ direction).
**Fig. S7** Each types of compound 3 showing the bi-layer arrangement.

**Fig. S8** The coordination environment of La$^{3+}$ ions in type A and type B.