The Influence of the Guest Ion on Synthesis and Sorption Properties of an Open Framework Lanthanide Tetrakisphosphonate

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Supporting information 1: Additional SEM micrographs

Figure S1: SEM micrographs of a) KLa(H₄L), b) NH₄La(H₄L) and c) RbLa(H₄L)
Supporting information 2: Illustration of the mechanism of the channel contraction of NaLa(H₄L):

Figure S2: Contraction and expansion of the channels in NaLa(H₄L) during the dehydration/hydration process: [001] projection of the crystal structure of (a) NaLa(H₄L), and (b) NaLa(H₄L)dehyd. Hydrogen atoms have been omitted for clarity.
Supporting information 3: Additional X-Ray diffractogramms

**Figure S3-1:** Powder pattern of \( \text{LiLa}(H_4L) \cdot 4\text{H}_2\text{O} \) and the dehydrated form \( \text{LiLa}(H_4L)_{\text{dehyd}} \). The reversible switch of the pattern upon dehydration indicates a contraction of the structure similar as demonstrated for \( \text{NaLa}(H_4L) \).

**Figure S3-2:** Powder pattern of a humidified sample of \( \text{KLa}(H_4L) \cdot (2+x)\text{H}_2\text{O} \) and the dehydrated form \( \text{KLa}(H_4L)_{\text{dehyd}} \). The reversible switch of the pattern upon dehydration indicates a contraction of the structure similar as demonstrated for \( \text{NaLa}(H_4L) \).
Supporting information 4: Additional water sorption isotherms

Figure S4: Water sorption isotherms of a) RbLa(H₄L) and b) (NH₄)La(H₄L)

Supporting information 5: Additional Thermogravimetric analyses

Figure S5: Thermogravimetric Analysis and Differential Calorimetry Measurement of a) (NH₄)La(H₄L) and b) NaLa(H₄L). In (NH₄)La(H₄L) water removal occurs in two energetically distinct endothermic steps.