Supplementary Information

Beryllosilicate Frameworks and Zeolites

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Figure S1 SEM micrograph of a crystal with the LSJ-10 structure type

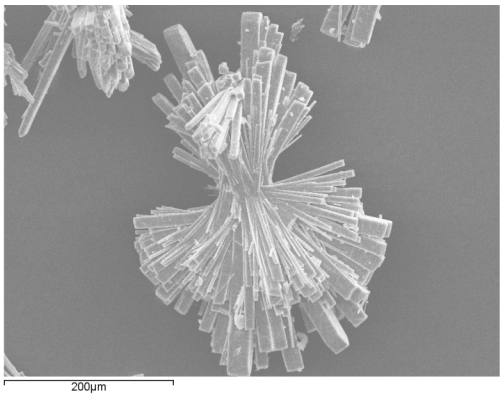
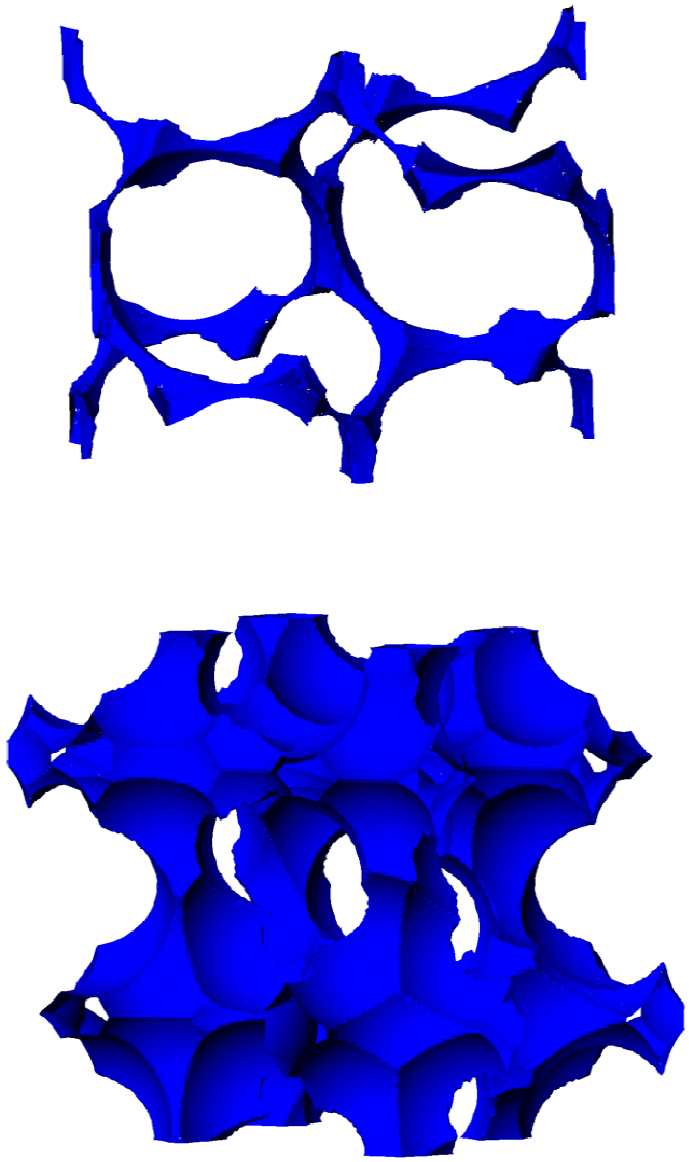


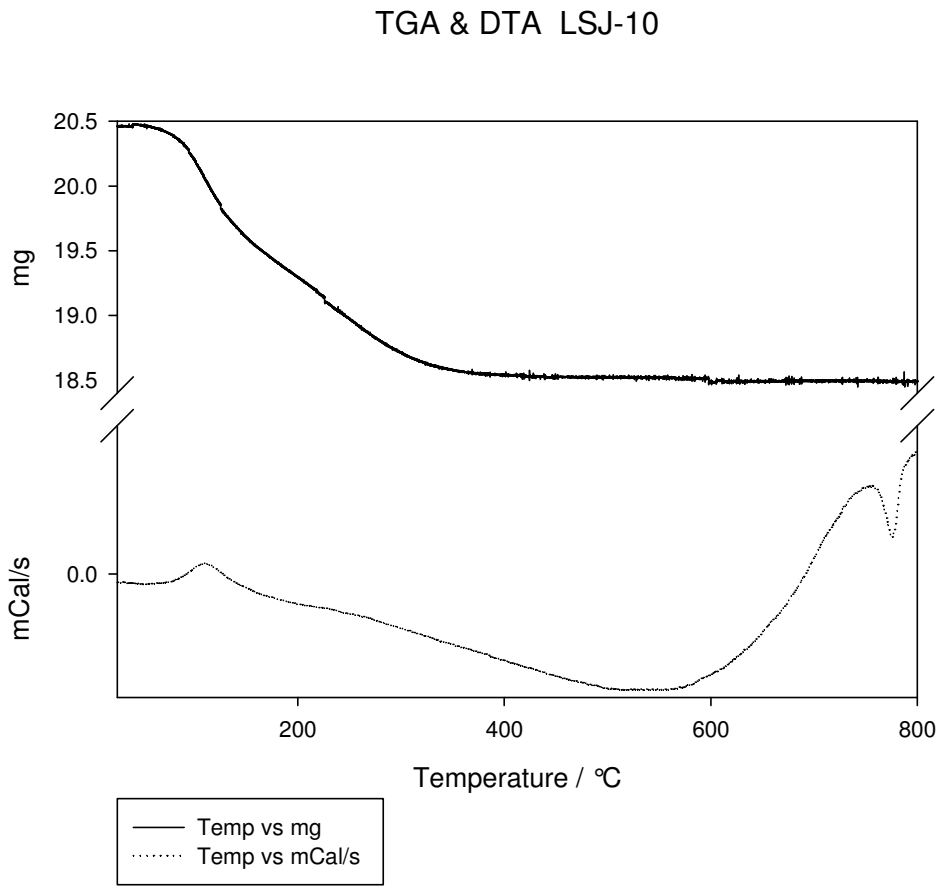
Figure S2

Comparison of free internal surface areas of **NAB** and LSJ-10

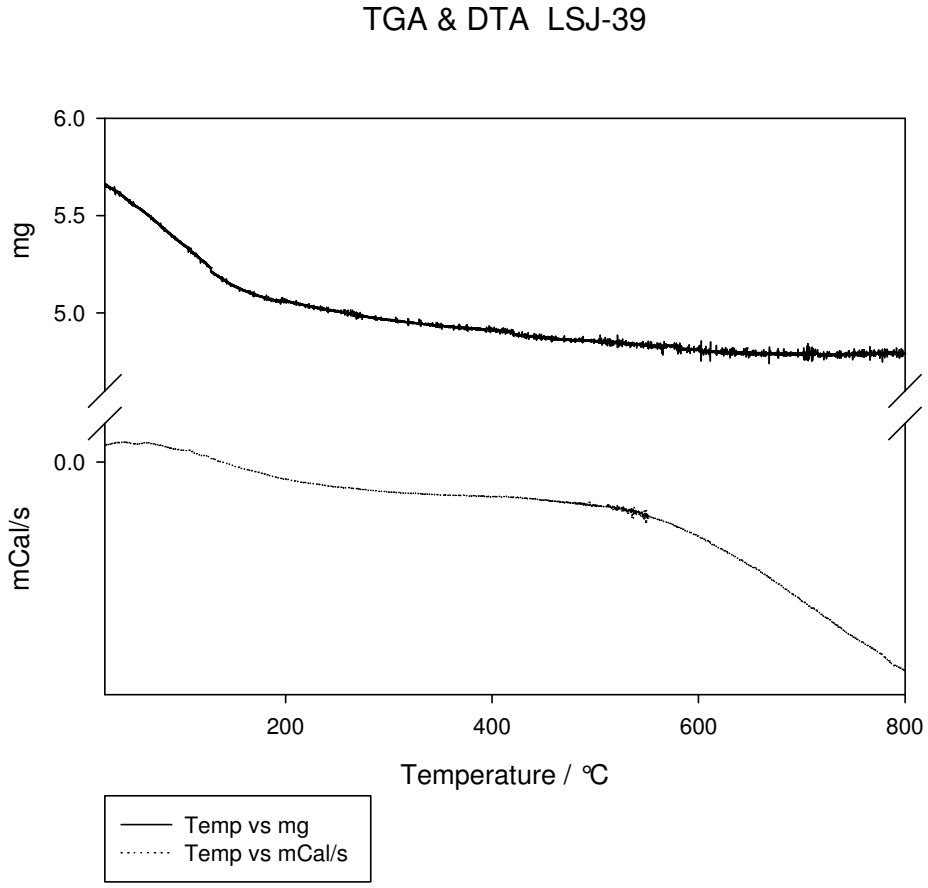


Figures S3

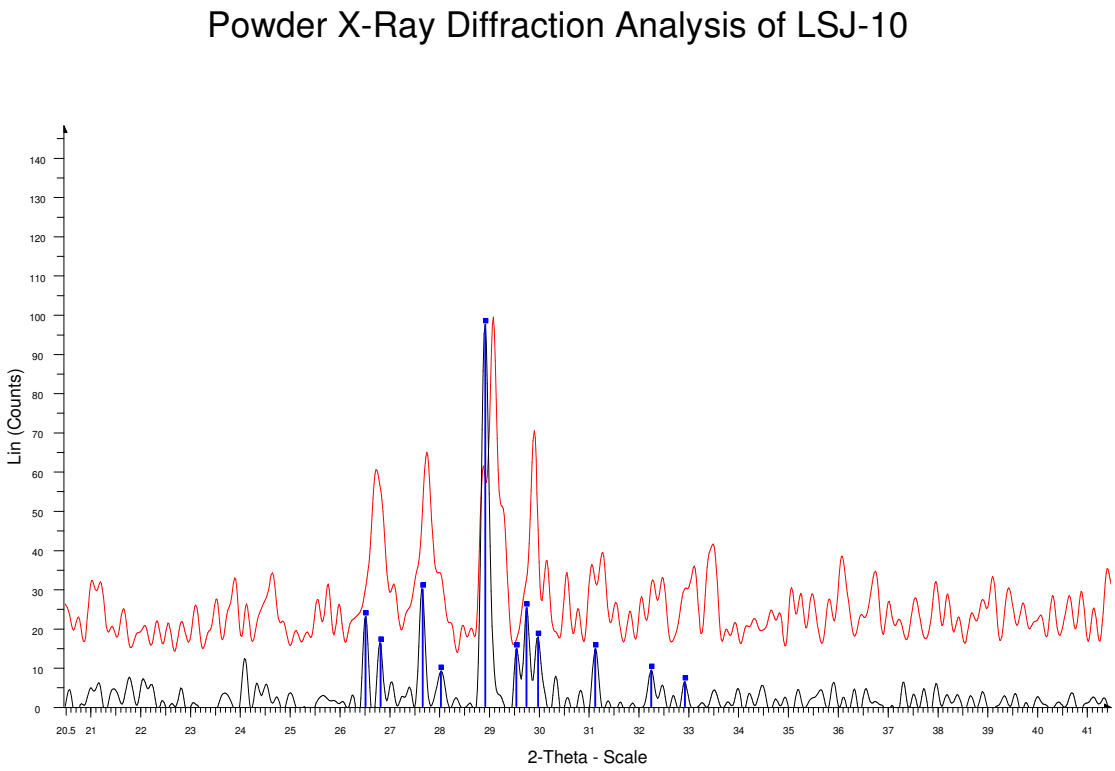
S3.1 Thermogravimetric and differential thermal analysis traces for LSJ-10



S3.2 Thermogravimetric and differential thermal analysis traces for LSJ-39 (impure)

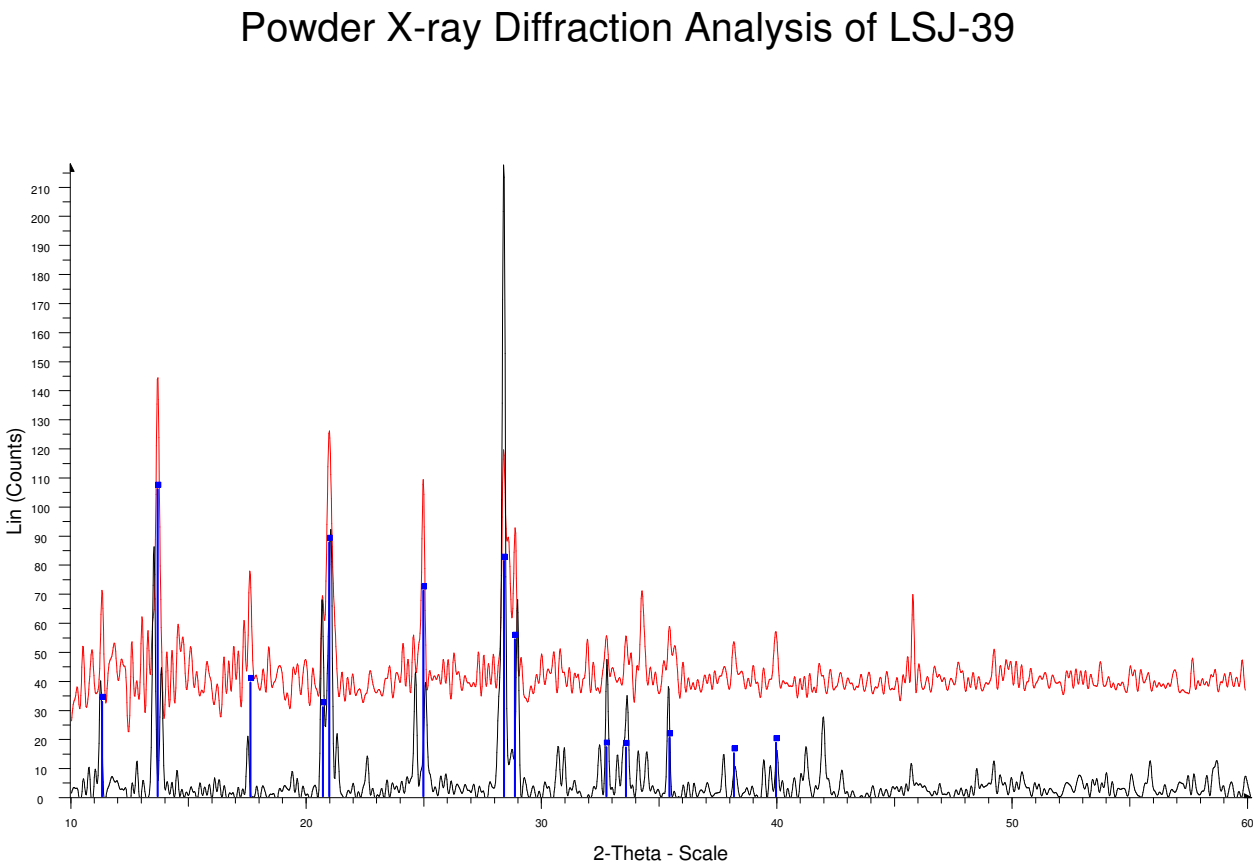


S3.3 Powder X-ray diffraction pattern of LSJ-10 after heating to ~750 °C compared to as-synthesised material



Lower pattern: LSJ-10 as synthesised; upper pattern LSJ-10 after annealing at ~750 °C for 24 hours.

S3.4 Powder X-ray diffraction pattern of LSJ-39 after heating to ~650 °C compared to as-synthesised material



Lower pattern: LSJ-39 as synthesised; upper pattern LSJ-39 after annealing at ~750 °C for 24 hours.

Figure S4. The puckered 5-connected net of tetrahedral centers in LSJ-39 highlighting the repeat unit of Cairo tiling formed from 4 distorted pentagons; oxygen atoms are omitted.

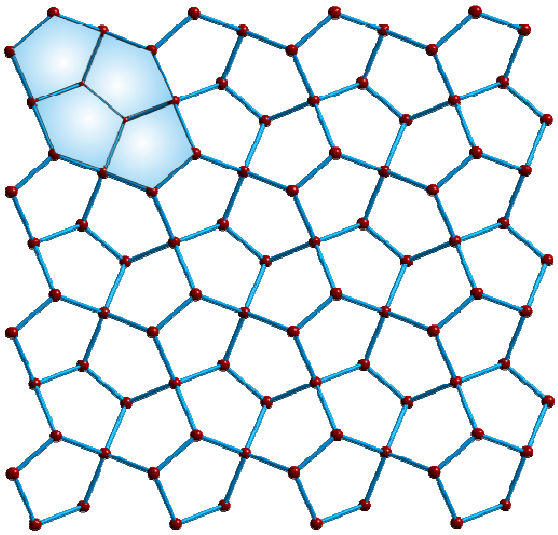


Table S1 Synthesis conditions

Table S1 Synthesis conditions and Reaction Details for LSJ-10 and LSJ-39

Molar Ratio							PRODUCTS
Sr	**Na**	**K**	**Be**	**Si**	**H_2O**	**TEA_2O**	
\	\	0.846	0.068	0.932	3.470	0.0175	**LSJ-10 topology**
0.0792	\	0.433	0.050	0.950	11.604	0.0416	**LSJ-39 topology**
\	0.393	\	0.032	0.968	1.979	0.0159	Reaction produced 3 different types of single crystal: **Na-Nabesite** **Gismondine** **Analcime**
\	\	0.433	0.050	0.950	10.654	0.0417	**Phillipsite**
\	\	0.393	0.032	0.968	1.979	0.0159	**K-Nabesite**
\	0.444	0.444	0.074	0.926	9.259	0.0370	**Merlinoite**

All reactions were performed at 175 °C; 48 hours.

The effect of template was investigated but appeared to have little effect, for example in the case of LSJ-10 replacing TEA_2O with DABCO still produced the product.

Method

The synthesis of the beryllosilicate phases all followed the same procedure. The synthesis of the two new zeotype topologies LSJ-10 and LSJ-39 are described in detail:

LSJ-10

Beryllium hydroxide powder was handled and in a glove box due to its extremely toxic nature. Beryllium hydroxide (0.086g) was placed inside the Teflon insert of a 23 ml Parr hydrothermal bomb. The lid was placed on the Telfon insert and wearing full protective clothing (including a particulate face mask) the complete Teflon insert and lid was transferred from the glove box to a fume cupboard. Potassium hydroxide solution (45 wt% in water) (7.0 ml), colloidal silica as LUDOX AS-40 (7.0 ml) and then tetraethylammonium hydroxide solution (1.0 ml) were added. The filled reaction insert and lid were immediately sealed, without stirring of the reaction mixture, in the main body of the Parr stainless steel hydrothermal autoclave. The hydrothermal autoclave bomb was heated under autogenous pressure at 175°C for 48 hours. The products were retrieved by vacuum filtration while wearing full protective clothing and waste solutions containing residual beryllium were disposed of safely. The solid product was washed with distilled water and dried in an oven at approximately 70-80 °C for 2 hours. In a typical reaction products were mixtures of white polycrystalline powder and groups of transparent, colorless, single crystals. Care should be taken in handling these products as they may contain residual $Be(OH)_2$ or BeO; single crystals were selected from samples immersed in paraffin oil.

LSJ-39

Beryllium hydroxide powder was handled and in a glove box due to its extremely toxic nature. Beryllium hydroxide (0.130g) was placed inside the Teflon insert of a 23 ml Parr hydrothermal bomb. The lid was placed on the Telfon insert and wearing full protective clothing (including a particulate face mask) the complete Teflon insert and lid was transferred from the glove box to a fume cupboard. In a separate beaker, strontium hydroxide octahydrate, 95% (8.000g) was dissolved in hot distilled water (20.0 ml). Potassium hydroxide solution (45 wt% in water) (1.5 ml), the pre-prepared strontium hydroxide solution (1.0 ml), colloidal silica as LUDOX AS-40 (3.0 ml) and then tetraethylammonium hydroxide solution (1.0 ml) were added. The filled reaction insert and lid were immediately sealed, without stirring of the reaction mixture, in the main body of the Parr stainless steel hydrothermal autoclave. The hydrothermal autoclave bomb was heated under autogenous pressure at 175°C for 48 hours. The products were retrieved by vacuum filtration while wearing full protective clothing and waste solutions containing residual beryllium were disposed of safely. The solid product was washed with distilled water and dried in an oven at approximately 70-80 °C for 2 hours. In a typical reaction products were mixtures of white amorphous/ polycrystalline powder and groups of transparent, colorless, single crystals. Care should be

taken in handling these products as they may contain residual $Be(OH)_2$ or BeO; single crystals were selected from samples immersed in paraffin oil.