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Rhombohedral to Cubic Phase Transition of Zeolite Rho at High-Pressure

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Beamline(s): X7A

Unit cell parameters of microporous aluminogermanates with zeolite rho topology were determined up to 5.0 GPa using a diamond-anvil cell and a 200 μm -focused monochromatic synchrotron radiation [1]. In addition to the previously reported cubic structures [2], we found for the first time the existence of a rhombohedral zeolite rho in one of our Li-exchanged forms at ambient conditions. Furthermore, when this material is pressurized in a water-bearing 4:1 methanol:ethanol mixture pressure-medium, it undergoes a reversible phase transition from a rhombohedral to cubic structure above 2.3 GPa. In the case of the as-synthesized NaCs-form, the initial cubic structure transforms to rhombohedral above 1.5 GPa and transforms back to cubic phase upon pressure release. These transitions are accompanied by a reduction in the unit cell volume, and calculated bulk moduli indicate that the high-pressure forms are consistently less compressible than the low-pressure counterparts. The structural details of the rhombohedral rho and the mechanism of its high-pressure phase transition will be investigated using neutron diffraction.

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References:

[1] Lee, Y.; Hriljac, J.A.; Vogt, T.; Parise, J.B. in preparation.

[2] Johnson, G.M.; Reisner, B.A.; Tripathi, A.; Corbin, D.R.; Toby, B.H.; Parise, J.B. *Chem. Mater.* **1999**, *11*, 2780-2787.

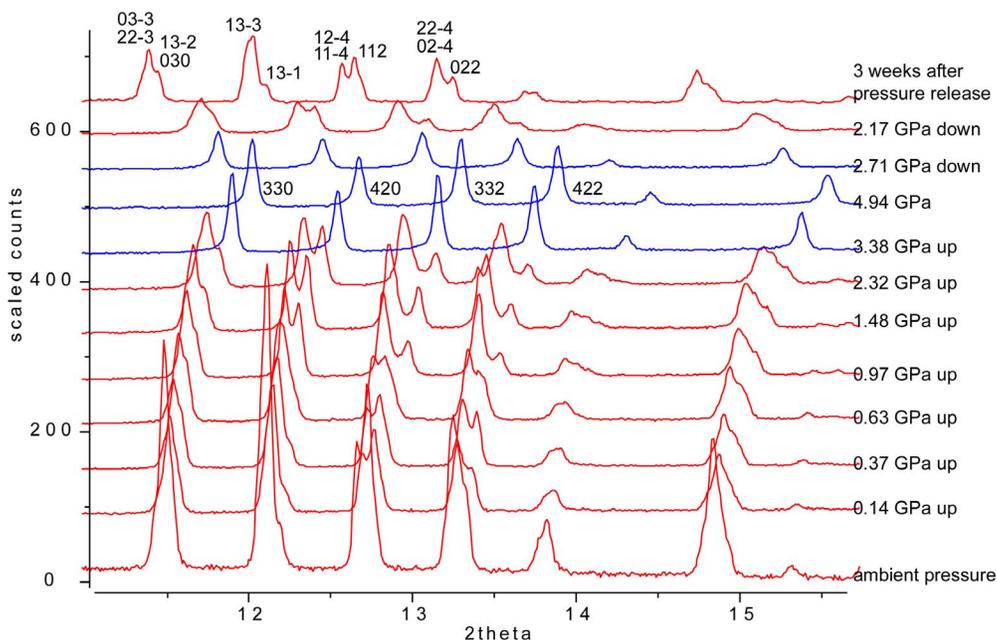


Figure. Stacked plot of powder diffraction patterns of Li-form of luminogermanate rho as a function of pressure.