Zhanghuifenite  

\[ \text{Na}_3\text{Mn}^{2+}_4\text{Mg}_2\text{Al(PO}_4\text{)}_6 \]

**Crystal Data**: Monoclinic.  
**Point Group**: 2/m. 
Massive in irregular veinlets or patches, 5 mm thick, in a nodule of beusite interlaminated with lithiophilite. Broken pieces of zhanghuifenite are blocky or tabular. Single crystals to 0.8 mm.


\[ \text{D(meas.)} = 3.63(2) \quad \text{D(calc.)} = 3.62 \]


**Optical Class**: Biaxial (+).  
\[ \alpha = 1.675(2) \quad \beta = 1.680(2) \quad \gamma = 1.690(2) \quad 2V(\text{meas.}) = 74(2)^\circ \]

2V(calc.) = 71° 
Orientation: \( \alpha \wedge X = 8°, \beta = Y \)

**Chemistry**:  
(1) Santa Ana mine, San Luis province, Argentina; electron microprobe analysis supplemented by Raman spectroscopy, \( \text{Fe}^{2+}/\text{Fe}^{3+} \) ratio adjusted for electroneutrality; corresponding to 
\[ (\text{Na}_{2.80}\text{Ca}_{0.11})_{\Sigma=2.91}\text{Mn}^{2+}_{3.09}\text{Fe}^{2+}_{0.47}\text{Mg}_{0.36})_{\Sigma=3.92}\text{Mg}_{1.31}\text{Fe}^{2+}_{0.69})_{\Sigma=2.00}\text{Al}_{0.81}\text{Fe}^{3+}_{0.19})(\text{PO}_4)_6 \]

**Mineral Group**: Alluaudite supergroup.

**Occurrence**: Attributed to veining, produced possibly by a late-stage, fluid-rich peraluminous melt in a zoned granitic pegmatite.

**Association**: Beusite, lithiophilite.

**Distribution**: At the Santa Ana mine, San Luis province, Argentina [TL].

**Name**: Honors Chinese mineralogist, Professor Huifen Zhang (1934-2012), Institutes of Geochemistry in Guiyang and Guangzhou, China.

**Type Material**: University of Arizona Mineral Museum (21321) and the RRUFF Project (R160030), Tucson, Arizona, USA.

**References**:  
(1) Yang, H., A. Kobsch, X. Gu, R.T. Downs, and X. Xie (2021) Zhanghuifenite, \( \text{Na}_3\text{Mn}^{2+}_4\text{Mg}_2\text{Al(PO}_4\text{)}_6 \), a new mineral isostructural with bobfergusonite, from the Santa Ana mine, San Luis province, Argentina. Amer. Mineral., 106, 1009-1015.