Tsangpoite $Ca_5(PO_4)_2(SiO_4)$

Crystal Data: Hexagonal. *Point Group*: 6/*m* or 6. As oriented rod-like crystals to 20 μm with hexagonal cross sections, frequently with a central tube filled with opaque minerals of FeS + Mag ± ferrite (bcc Fe) ± Fe-S-O phases; also, skeletal.

Physical Properties: *Cleavage*: n.d. *Tenacity*: n.d. *Fracture*: n.d. Hardness = n.d. D(meas.) = n.d. D(calc.) = n.d.

Optical Properties: *Color*: Grayish in transmitted light. *Streak*: n.d. *Luster*: n.d. *Optical Class*: n.d.

Cell Data: *Space Group*: $P6_3/m$ or $P6_3$. a = 9.489(4) c = 6.991(6) Z = 2

X-ray Powder Pattern: D'Orbigny angrite meteorite (intensities not given). 3.94, 3.50, 3.10, 2.83, 2.82, 2.74, 2.66, 2.28

Chemistry:

	(1)		(1)
SiO_2	12.44	F	0.46
TiO_2	1.66	Cl	0.14
Al_2O_3	0.31	ZnO	0.10
FeO	5.69	SrO	0.19
MnO	0.03	Y_2O_3	0.13
MgO	0.01	La_2O_3	0.12
CaO	47.62	Pr_2O_3	0.14
K_2O	0.01	Nd_2O_3	0.08
Cr_2O_3	0.04	SO_3	0.46
NiO	0.04	Ce_2O_3	0.04
P_2O_5	29.82	Total	99.53

(1) D'Orbigny angrite meteorite; average electron microprobe analysis supplemented by Raman spectroscopy; corresponds to $(Ca_{8.07}\square_{0.84}Fe^{3+}_{0.75}Ti_{0.20}Al_{0.06}REE_{0.02}Sr_{0.02}Y_{0.01}Cr_{0.01}Ni_{0.01}Zn_{0.01})_{\Sigma=10.0}[(P_{3.99}Si_{1.97}S_{0.06})_{\Sigma=6.02}(O_{23.72}F_{0.23}Cl_{0.04})_{\Sigma=23.99}]$.

Polymorphism & Series: A dimorph of silicocarnotite.

Occurrence: In an angrite meteorite as well-defined domains associated with Fe sulfide near the contact between fayalite-kirschsteinite overgrowth/symplectite and hedenbergite.

Association: Kuratite, ulvöspinel, hedenbergite, Ca and Fe olivine, Fe sulfide.

Distribution: From the D'Orbigny angrite meteorite.

Name: Honors Professor Dr. *Tsang-Po* Yen (1914-1994), senior geologist of the Geological Survey of Taiwan (1946-1974) and director of the Institute of Geophysics, National Central University, Taiwan (1974-1981). Professor Yen contributed immensely to mineralogical, petrological, ore deposit, and tectonic studies in Taiwan.

Type Material: Natural History Museum, Vienna, Austria (Section D'Orbigny C-N1172-NH Wien) and the National Museum of Natural Science, Taiwan, ROC (NMNS007600-P020440).

References: (1) Hwang, S.L., P. Shen, H.T. Chu, T.F. Yui, M.E. Varela, and Y. Iizuka (2019) New minerals tsangpoite $Ca_5(PO_4)_2(SiO_4)$ and matyhite $Ca_9(Ca_{0.5}\square_{0.5})Fe(PO_4)_7$ from the D'Orbigny angrite. Mineral. Mag., 83, 293-313.