Petedunnite $CaZnSi_2O_6$

Crystal Data: Monoclinic. *Point Gro*up: 2/*m*. As portions of an anhedral crystal consisting of a mosaic of 10-100 μm-sized subgrains containing abundant inclusions.

Physical Properties: *Cleavage*: {110}. Hardness = n.d. D(meas.) = n.d. D(calc.) = 3.68

Optical Properties: Translucent. *Color*: Dark green; in transmitted light, light yellow to pale green. *Luster*: Vitreous.
Optical Class: Biaxial (+). α = 1.68(1) β = 1.69(1) γ = 1.70(1) 2V(meas.) = 70°-90°
Pleochroism: *X* = *Y* = light yellow; *Z* = light green. *Orientation*: *Y* = *b*; *Z* ^ *c* = 35°-45°.
Dispersion: *r* > *v*; strong. *Absorption*: *Z* > *X* = *Y*.

Cell Data: Space Group: *C*2/*c*. *a* = 9.82(2) *b* = 9.00(1) *c* = 5.27(2) β = 105.6(2) ° Z = 4

X-ray Powder Pattern: Franklin, New Jersey, USA.
3.02 (100), 2.537 (80), 2.96 (40), 2.589 (30), 2.022 (30), 6.49 (10), 2.227 (10)

Chemistry:	(1)
SiO_2	48.4
Al_2O_3	1.2
Fe_2O_3	[3.8]
FeO	[5.7]
MnO	5.8
ZnO	12.6
MgO	2.4
CaO	21.3
Na_2O	0.7
Total	101.9

(1) Franklin, New Jersey, USA; by electron microprobe, Fe^{2+}:Fe^{3+} by charge balance; corresponds to $(Ca_{0.92}Na_{0.06}Mn_{0.02})_{\Sigma=1.00}(Zn_{0.37}Fe^{2+}_{0.19}Mn_{0.18}Mg_{0.14}Fe^{3+}_{0.12})_{\Sigma=1.00}(Si_{1.94}Al_{0.06})_{\Sigma=2.00}O_6$.

Mineral Group: Ca pyroxene group.

Occurrence: In a metamorphosed stratiform zinc deposit, apparently formed under relatively high activity of sulfur and oxygen. Formed at high pressures (P > 0.8 GPa); at lower pressures and temperatures (>650 °C) decomposes to willemite, hardystonite, and quartz.

Association: Calcite, gahnite, willemite, genthelvite, garnet, albite, sphalerite.

Distribution: From Franklin, Sussex Co., New Jersey, USA.

Name: In honor of Dr. Pete J. Dunn, Department of Mineral Sciences (1984-2007), Smithsonian Institution, Washington, D.C., USA, for contributions to the mineralogy of Franklin and Sterling Hill, New Jersey, USA.

Type Material: Department of Geological Sciences, University of Michigan, Ann Arbor, Michigan; National Museum of Natural History, Washington, D.C., USA (NMNH 162211).

References: (1) Essene, E.J. and D.R. Peacor (1987) Petedunnite ($CaZnSi_2O_6$); a new zinc clinopyroxene from Franklin, New Jersey, and phase equilibria for zincian pyroxenes. Amer. Mineral., 72, 157-166. (2) Huber, A.L., S. Heuss-Aßbichler, K.T. Fehr, and G.D. Bromiley (2012) Petedunnite ($CaZnSi_2O_6$): Stability and phase relations in the system CaO-ZnO-SiO_2. Amer. Mineral., 97, 739-749.