Dorrite $\mathbf{Ca_2Mg_2Fe_4^{3+}Al_4Si_2O_{20}}$

Crystal Data: Triclinic, pseudomonoclinic by twinning. *Point Group:* $\overline{1}$ or 1. As anhedral to prismatic grains, to 0.1 mm; some grains exhibit hopper and skeletal crystal habit. *Twinning:* Twinned by two-fold rotation about the pseudomonoclinic [010] axis.

Physical Properties: *Cleavage:* Good on {010} and {001}. *Fracture:* Irregular. *Tenacity:* Brittle. Hardness = ∼5 D(meas.) = n.d. D(calc.) = 3.959

Optical Properties: Nearly opaque. *Color:* Dark red-brown to dark brown. *Streak:* Gray. *Luster:* Submetallic.
Optical Class: Biaxial. *Pleochroism:* In ultrathinned sections, very strong; X = red-orange-brown; Y = yellowish brown; Z = greenish brown. *Absorption:* Extreme. $\alpha = 1.82(1)$ $\beta = 1.84(1)$ $\gamma = 1.86(1)$ 2V(meas.) = 90°

Cell Data: *Space Group:* $P\overline{1}$ or $P1$. $a = 10.505(3)$ $b = 10.897(3)$ $c = 9.019(1)$ $\alpha = 106.26(2)°$ $\beta = 95.16(2)°$ $\gamma = 124.75(2)°$ Z = 2

X-ray Powder Pattern: Durham ranch, Wyoming, USA.
2.971 (100), 2.558 (80), 2.515 (80), 2.125 (60), 1.511 (30), 1.482 (30), 8.1 (20)

Chemistry:

	(1)	(2)
SiO_2	11.16	14.37
TiO_2	0.56	
Al_2O_3	24.85	24.39
Fe_2O_3	41.65	38.19
Cr_2O_3	0.05	
FeO	2.77	
MnO	0.19	
MgO	5.57	9.64
CaO	13.63	13.41
Na_2O	0.02	
K_2O	0.02	
Total	100.47	100.00

(1) Durham ranch, Wyoming, USA; by electron microprobe, Fe^{2+}:Fe^{3+} calculated from stoichiometry; corresponding to $(Ca_{1.99}Na_{0.01})_{\Sigma=2.00}(Mg_{1.19}Fe^{2+}_{0.33}Fe^{3+}_{0.29}Ca_{0.10}Ti_{0.06}Mn_{0.02}Cr_{0.01})_{\Sigma=2.00}Fe^{3+}_{4.00}Al_{4.00}(Si_{1.60}Al_{0.20}Fe^{3+}_{0.20})_{\Sigma=2.00}O_{20}$. (2) $Ca_2Mg_2Fe_4Al_4Si_2O_{20}$.

Mineral Group: Aenigmatite group.

Occurrence: A product of oxidizing, high-temperature, low-pressure metamorphism of alkalic rocks, in a pyrometamorphic zone in sediments.

Association: Esseneite, titanian andradite, magnetite-magnesioferrite-spinel, plagioclase, gehlenite-åkermanite, wollastonite, ulvöspinel, nepheline, apatite, ferroan sahamalite.

Distribution: From the Durham ranch, Powder River basin, 13 km northeast of Reno Junction and 25 km south of Gillette, Campbell Co., Wyoming, USA.

Name: To honor Dr. John A. Dorr, Jr., Professor of Geology, University of Michigan, Ann Arbor, Michigan, USA, in recognition of his regional geologic research in Wyoming.

Type Material: University of Michigan, Ann Arbor, Michigan; National Museum of Natural History, Washington, D.C., USA, 163357.

References: (1) Cosca, M.A., R.R. Rouse, and E.J. Essene (1988) Dorrite [$Ca_2(Mg_2Fe^{3+}_4)(Al_4Si_2)O_{20}$], a new member of the aenigmatite group from a pyrometamorphic melt-rock. Amer. Mineral., 73, 1440–1448.