

**Dingdaohengite-(Ce)****(Ce, La)<sub>4</sub>Fe<sup>2+</sup>(Ti, Fe<sup>2+</sup>, Mg, Fe<sup>3+</sup>)<sub>2</sub>Ti<sub>2</sub>Si<sub>4</sub>O<sub>22</sub>**

**Crystal Data:** Monoclinic. *Point Group:* 2/m. Crystals are short prismatic or thick tabular on (001) to 1.5 cm. *Twining:* Sometimes observed.

**Physical Properties:** *Cleavage:* None observed. *Fracture:* Conchoidal. *Tenacity:* Brittle. Hardness = ~5.9 VHN = 606-717, 650 average (25 g load). D(meas.) = 4.83(7) D(calc.) = 4.88 Non-fluorescent.

**Optical Properties:** Translucent to opaque. *Color:* Black, brown-black in thin fragments; grayish yellow in reflected light with weak anisotropy and birefractance. *Streak:* Brown.

*Luster:* Submetallic-metallic.

*Optical Class:* Biaxial (-).  $\alpha = 1.978(5)$   $\beta = \text{n.d.}$   $\gamma = 2.010(5)$   $2V \approx 60^\circ$  *Pleochroism:* Strong, X = yellowish or brownish, Z = brown black. *Dispersion:*  $r > v$ . *Orientation:*  $Y = b, c \wedge r \approx 4^\circ$ .

R<sub>1</sub>-R<sub>2</sub>: (400) 10.1-10.4, (420) 10.4-10.9, (440) 10.7-10.8, (460) 10.7-11.0, (470) 11.0-11.8, (480) 11.2-11.8, (500) 11.4-11.8, (560) 11.6-12.1, (580) 11.6-11.9, (589) 11.4-12.5, (600) 11.0-11.8, (620) 10.6-11.7, (640) 10.6-11.6, (650) 10.6-11.8

**Cell Data:** *Space Group:* P2<sub>1</sub>/a (pseudo C2/m).  $a = 13.4656(15)$   $b = 5.7356(6)$   $c = 11.0977(12)$   $\beta = 100.636(2)^\circ$   $Z = 2$

**X-ray Powder Pattern:** Bayan Obo REE-Nb-Fe Mine, near Baotou city, North China.

2.7524 (100), 2.7263 (98), 3.1978 (68), 2.5460 (54), 2.8702 (52), 3.1622 (46), 4.6154 (39)

Chemistry:	(1)		(1)
SiO <sub>2</sub>	19.29	MgO	1.32
TiO <sub>2</sub>	18.26	CaO	2.17
Al <sub>2</sub> O <sub>3</sub>	0.04	Nb <sub>2</sub> O <sub>5</sub>	0.47
FeO	8.49	La <sub>2</sub> O <sub>3</sub>	19.53
Fe <sub>2</sub> O <sub>3</sub>	1.67	<u>Ce<sub>2</sub>O<sub>3</sub></u>	<u>28.08</u>
ThO <sub>2</sub>	0.16	Total	99.48

(1) Bayan Obo REE-Nb-Fe Mine, near Baotou city, North China; electron microprobe analysis supplemented by Mössbauer spectroscopy for Fe<sup>3+</sup>/Fe<sup>2+</sup> ratio; corresponding to (Ce<sub>2.13</sub>La<sub>1.49</sub>Ca<sub>0.48</sub>Th<sub>0.01</sub>)<sub>Σ=4.11</sub>Fe<sup>2+</sup>(Ti<sub>0.88</sub>Fe<sup>2+</sup><sub>0.47</sub>Mg<sub>0.41</sub>Fe<sup>3+</sup><sub>0.26</sub>Al<sub>0.01</sub>)<sub>Σ=2.03</sub>(Ti<sub>1.96</sub>Nb<sub>0.04</sub>)<sub>Σ=2.00</sub>(Si<sub>2</sub>O<sub>7</sub>)<sub>2</sub>O<sub>8</sub>.

**Polymorphism & Series:** Polymorph of perrierite-(Ce).

**Mineral Group:** Chevkinite supergroup, chevkinite group.

**Occurrence:** In magnesian skarn in the excontact of granite within dolomitic marble.

**Association:** Diopside, tremolite, richterite, F-rich phlogopite, humite, chlinohumite, chondrodite, allanite-(Ce), magnetite, ilmentite, spinel, titanite, pyrochlore, fluorapatite, fluorellestadite(?), calcite, dolomite, pyrite, quartz, fluorite, zircon.

**Distribution:** Bayan Obo REE-Nb-Fe mine, near Baotou city, Inner Mongolian Autonomous Region, North China.

**Name:** Honors *Ding Daoheng* (1899-1955), who discovered the world-famous Bayan Obo REE-Nb-Fe ore deposit in 1927 and a suffix indicates that Ce is the dominant rare-earth element.

**Type Material:** Geological Museum of China, Beijing, China.

**References:** (1) Xu, J., G. Yang, G. Li, Z. Wu, and G. Shen (2008) Dingdaohengite-(Ce) from the Bayan Obo REE-Nb-Fe Mine, China: Both a true polymorph of perrierite-(Ce) and a titanic analog at the C1 site of chevkinite subgroup. *Amer. Mineral.*, 93, 740-744.