

# Braggite

(Pt, Pd, Ni)S

©2001-2005 Mineral Data Publishing, version 1

**Crystal Data:** Tetragonal. *Point Group:* 4/m or 4. As prisms, to 2 cm, and rounded grains. *Twinning:* Rarely observed.

**Physical Properties:** Hardness = n.d. VHN = 946–1064, 997 average (100 g load). D(meas.) = ~10 D(calc.) = 9.383

**Optical Properties:** Opaque. *Color:* White in reflected light. *Luster:* Metallic.

*Anisotropism:* Distinct, in purplish and pinkish shades of gray and brown.

R<sub>1</sub>–R<sub>2</sub>: (400) 41.3–41.8, (420) 41.8–42.4, (440) 42.1–43.0, (460) 42.4–43.4, (480) 42.5–43.8, (500) 42.7–44.1, (520) 42.7–44.2, (540) 42.6–44.2, (560) 42.5–44.2, (580) 42.4–44.2, (600) 42.3–44.1, (620) 42.2–44.1, (640) 41.9–44.0, (660) 41.9–43.9, (680) 41.9–43.8, (700) 41.5–43.8

**Cell Data:** *Space Group:* P4<sub>2</sub>/m. a = 6.367 c = 6.561 Z = 8

**X-ray Powder Pattern:** Potgietersrus district, South Africa; can be confused with vysotskite.

2.86 (100), 2.93 (30), 2.64 (30), 1.852 (30), 1.423 (30), 1.713 (20), 1.595 (2)

Chemistry:	(1)	(2)	(1)	(2)
Pt	63.2	62.1	Ni	4.4
Pd	15.4	19.0	S	17.4
			<hr/>	<hr/>
			Total	100.4
				100.0

(1) Potgietersrus district, South Africa; by electron microprobe, corresponding to (Pt<sub>0.60</sub>Pd<sub>0.27</sub>Ni<sub>0.14</sub>)<sub>Σ=1.01</sub>S<sub>1.00</sub>. (2) Stillwater complex, Montana, USA; by electron microprobe, corresponding to (Pt<sub>0.60</sub>Pd<sub>0.34</sub>Ni<sub>0.06</sub>)<sub>Σ=1.00</sub>S<sub>1.00</sub>.

**Polymorphism & Series:** Forms a series with vysotskite; dimorphous with cooperite.

**Occurrence:** In layered mafic intrusives, formed at high magmatic temperatures.

**Association:** Sperrylite, cooperite, laurite, platinum (Potgietersrus district, South Africa); pentlandite, pyrrhotite, chalcopyrite, cubanite, nickelian mackinawite, gold, cooperite, vysotskite, moncheite, isoferrroplatinum, kotulskite, keithconnite, palladian tulameenite (Stillwater complex, Montana, USA).

**Distribution:** One of most common and economically important platinum group minerals. From the Rustenburg and Potgietersrus [TL] districts, in the Merensky Reef, Bushveld complex, Transvaal, South Africa. At the Stillwater complex, Montana, USA. From the Lac des Iles complex, Ontario, Canada. In the Santiago River, Esmeraldas Province, Ecuador. At the Luanga complex, Serra dos Carajas, Para, Brazil. From the Noril'sk region, western Siberia, and in the Lukkulaivaara layered intrusion, Karelia, Russia. On Rum Island, Inner Hebrides, Scotland. In the Siikakama intrusion and the Kirakka-juppura deposit, Penikat layered complex, northeast of Kemi, Finland. At Little Darling Creek, east of Broken Hill, New South Wales, Australia. On Round Hill, near Orepuki, New Zealand. Additional localities are known.

**Name:** To honor Sir William Henry Bragg (1862–1942) and Professor William Lawrence Bragg (1890–1971), Cambridge University, Cambridge, England, pioneers in the X-ray investigation of crystals, as this was the first new mineral to be discovered by X-ray methods alone.

**Type Material:** The Natural History Museum, London, England, 1932, 1303–1304; National Museum of Natural History, Washington, D.C., USA, 105857.

**References:** (1) Palache, C., H. Berman, and C. Frondel (1944) Dana's system of mineralogy, (7th edition), v. I, 259. (2) Childs, J.D. and Hall, S.R. (1973) The crystal structure of Braggite. *Mineralogical Magazine*, 38, 1–10. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise without the prior written permission of Mineral Data Publishing.

braggite, (Pt,Pd,Ni)S. *Acta Cryst.*, 29, 1446–1451. (3) Cabri, L.J., J.H.G. Laflamme, J.M. Stewart, K. Turner, and B.J. Skinner (1978) On cooperite, braggite, and vysotskite. *Amer. Mineral.*, 63, 832–839. (4) Verryn, S.M.C. and R.K.W. Merkle (1994) Compositional variation of cooperite, braggite, and vysotskite from the Bushveld Complex. *Mineral. Mag.*, 58, 223–234. (5) Cabri, L.J., Ed. (1981) Platinum group elements: mineralogy, geology, recovery. *Can. Inst. Min. & Met.*, 100. (6) Berry, L.G. and R.M. Thompson (1962) X-ray powder data for the ore minerals. *Geol. Soc. Amer. Mem.* 85, 71–72. (7) Criddle, A.J. and C.J. Stanley (1985) Characteristic optical data for cooperite, braggite and vysotskite. *Can. Mineral.*, 23, 149–162.