Kingstonite $(Rh,Ir,Pt)_3S_4$

Crystal Data: Monoclinic. *Point Group:* 2/*m.* As elongate, tabular inclusions in 40 μm.

Physical Properties: *Cleavage*: Good ‖ [100]. *Fracture*: Subconchoidal. *Tenacity*: Brittle. Hardness = ~ 6 VHN = 871-920 (25 g load). D(meas.) = n.d. D(calc.) = 7.52

Optical Properties: Opaque. *Color*: Black, pale brownish gray in reflected light. *Streak*: Black. *Luster*: Metallic.
Optical Class: n.d. *Anisotropism*: Weak to moderate, dull gray to brown.
R_1-R_2: (470) 47.2-48.9 $(33.2\text{-}34.7)_{oil}$, (546) 48.4-50.3 $(34.3\text{-}36.1)_{oil}$, (589) 49.1-50.7 $(35.0\text{-}36.5)_{oil}$, (650) 49.8- 51.0 $(35.6\text{-}36.7)_{oil}$

Cell Data: Space Group: *C*2/*m*. $a = 10.4616(5)$ $b = 10.7527(5)$ $c = 6.2648(3)$ $\beta = 109.000(5)°$ $Z = 6$

X-ray Powder Pattern: Bir Bir River, Yubdo district, Wallaga province, Ethiopia.
3.156 (100), 3.081 (100), 2.957 (90), 1.791 (90), 1.871 (80), 1.532 (70), 2.234 (60)

Chemistry:

	(1)	(2)
Rh	46.5	46.73
Pt	11.2	11.27
Ir	16.4	16.46
S	25.6	25.54
Total	99.7	100.00

(1) Bir Bir River, Yubdo district, Wallaga province, Ethiopia; average of 20 electron microprobe analyses; corresponds to $(Rh_{2.27}Ir_{0.43}Pt_{0.29})_{\Sigma=2.99}S_{4.01}$. (2) $(Rh_{2.28}Ir_{0.43}Pt_{0.29})_{\Sigma=2.99}S_{4.01}$.

Occurrence: In placers derived from platinum-bearing dunite and pyroxenite, as inclusions in a Pt-Fe alloy.

Association: Isoferroplatinum, tetraferroplatinum, laurite, bowieite, ferrorhodsite, cuprorhodsite.

Distribution: From the Bir Bir River, Yubdo district, Wallaga province, Ethiopia.

Name: Honors Dr. Gordon Andrew Kingston (b. 1939), senior lecturer, Department of Geology, University of Wales, College of Cardiff, Wales, U.K., for his contributions to PGE mineralogy.

Type Material: Natural History Museum, London, England (BM 2004, 56) and the Systematic Reference Series, National Mineral Collection, Geological Survey of Canada, Ottawa, Canada.

References: (1) Stanley, C.J., A.J. Criddle, J. Spratt, A.C. Roberts, J.T. Szymański, and M.D. Welch (2005) Kingstonite, $(Rh,Ir,Pt)_3S_4$, a new mineral species from Yubdo, Ethiopia. Mineral. Mag., 69, 447-453. (2) (2006) Amer. Mineral., 91, 711-712 (abs. ref. 1).