Ruthenium Ru

Crystal Data: Hexagonal. *Point Group:* $6/m\ 2/m\ 2/m$. As a tabular crystal, to 35 μm, partly included in platinum; granular.

Physical Properties: Hardness = n.d. VHN = 841–907, 872 average (100 g load). D(meas.) = n.d. D(calc.) = 12.438

Optical Properties: Opaque. *Color:* White with pale creamy tint in reflected light. *Anisotropism:* Weak.
R_1–R_2: (400) 68.8, (420) 69.1, (440) 69.5, (460) 70.0, (480) 70.3, (500) 70.6, (520) 70.7, (540) 70.5, (560) 70.1, (580) 69.5, (600) 68.8, (620) 67.9, (640) 67.0, (660) 66.0, (680) 65.2, (700) 64.7

Cell Data: *Space Group:* $P6_3/mmc$ (synthetic). $a = 2.7058$ $c = 4.2819$ $Z = 2$

X-ray Powder Pattern: Synthetic.
2.056 (100), 2.343 (40), 2.142 (35), 1.5808 (25), 1.3530 (25), 1.2189 (25), 1.1434 (25)

Chemistry:

	(1)
Ru	64.43
Ir	14.62
Pt	9.14
Rh	7.05
Os	5.29
Pd	0.49
Fe	0.21
Ni	trace
Cu	trace
Total	101.23

(1) Uryu River, Japan; by electron microprobe, corresponding to $(Ru_{0.74}Ir_{0.09}Rh_{0.08}Pt_{0.05}Os_{0.03}Pd_{0.01})_{\Sigma=1.00}$.

Occurrence: In a platinum grain (Uryu River, Japan).

Association: Platinum, other PGE minerals.

Distribution: In gravels of the Uryu River, near Horokanai, Hokkaido, Japan [TL]. In Russia, from Nizhni Tagil, Ural Mountains, and in a placer on the Upper Miass River, Southern Ural Mountains. In the Waiau River, western Southland, New Zealand. From the Kraubath ultramafic massif, Styria, Austria. In the USA, in the Yuba River, Nevada Co., California; at Tennessee Pass, Josephine Co, Oregon. In concentrates from the Wellgreen Cu–Ni–Pt–Pd deposit, Yukon Territory, Canada. At Rio Pilpe, Guapi Co., Colombia. Additional poorly specified localities are recorded.

Name: From the Latin *Ruthenia*, for *Ukraine* or *Russia*, as the element was found associated with platinum in the Ural Mountain placers, Russia; the name applied to hexagonal alloys with dominant Ru.

Type Material: University of Kagoshima, Kagoshima, Japan.

References: (1) Urashima, Y., T. Wakabayashi, T. Masaki, and Y. Terasaki (1974) Ruthenium, a new mineral from Horokanai, Hokkaido, Japan. Mineral. J. (Japan), 7, 438–444. (2) (1976) Amer. Mineral., 61, 177 (abs. ref. 1). (3) Ewald, P.P. and C. Hermann, Eds. (1931) Ruthenium, *Ru*. Strukturbereicht, 1, 69 (in German). (4) (1955) NBS Circ. 539, 4, 5. (5) Criddle, A.J. and C.J. Stanley, Eds. (1993) Quantitative data file for ore minerals, 3rd ed. Chapman & Hall, London, 491.