

Crystal Data: Cubic. *Point Group:* $4/m\bar{3}2/m$, possibly $\bar{4}3m$. Most commonly octahedral, crystals to 10 cm or more, also dodecahedral, tetrahedral, and cubic. Curved and striated faces common; spherical, with internal radial structure. *Twinning:* Contact twins with {111} as twin plane; typically flattened on {111}; as penetration twins, may be repeated.

Physical Properties: *Cleavage:* {111}, perfect. *Fracture:* Conchoidal. *Tenacity:* Brittle. Hardness = 10 VHN = n.d. D(meas.) = 3.511 D(calc.) = 3.515 Fluorescent and phosphorescent; triboelectric; the highest thermal conductivity of any known substance.

Optical Properties: Transparent to translucent. *Color:* Colorless, pale yellow to deep yellow, brown, white, blue-white; less commonly in oranges, pinks, greens, blues, reds, gray to black.

Luster: Adamantine to greasy.

Optical Class: Isotropic. *Dispersion:* Strong. $n = 2.4354$ (486), 2.4175 (589), 2.4076 (687).

Anisotropism: Birefringent where strained.

R: n.d.

Cell Data: *Space Group:* $Fd\bar{3}m$. $a = 3.5595$ $Z = 8$

X-ray Powder Pattern: Synthetic.

2.06 (100), 1.261 (25), 1.0754 (16), 0.8182 (16), 0.8916 (8)

Chemistry: Nearly pure carbon.

Polymorphism & Series: Chaoite, graphite, and lonsdaleite are polymorphs.

Occurrence: Primarily formed in pipes, less commonly in dikes, of deep-seated, igneous origin, composed of kimberlite or lamproite, and in alluvial deposits formed by their weathering. In carbonaceous achondrite and iron meteorites; may be formed by impact.

Association: Forsterite, phlogopite, pyrope, diopside, ilmenite (kimberlite pipes); ilmenite, garnet, rutile, brookite, anatase, hematite, magnetite, tourmaline, gold, zircon, topaz (placers).

Distribution: Numerous occurrences world-wide, but only a few are of economic importance. Formerly important deposits were in India, in the Golconda region, and near Nāgpur and Bundelkhand. From the area around Diamantina, Minas Gerais, and other states in Brazil. In South Africa, formerly obtained from the Orange and Vaal Rivers; still from along the coast north into Namibia, with offshore reserves estimated at 3 Bct. Important current alluvial production from Lunda Norte Province, Angola; southeastern Sierra Leone; also from Bakwanga and Tchikapa, Kasai Province, Congo (Zaire). From South Africa, in several pipes around Kimberley, at the Finsch mine, near Postmasburg, Cape Province; from the Premier mine, near Pretoria, and the Venetia mine, Transvaal; about 150 diamondiferous pipes have been mined. From the Jwaneng and Orapa pipes, Botswana. In Russia, in Sakha, from the Mir (Peace), Udatchnaya (Success), Zarnitsa (Thunderflash), Aikhal (Glory), and Jubileynaya (Jubilee) pipes. In China, from pipes at the Wafangdian and Binhai mine, Liaoning Province; at Changma, near Mengyin, Shandong Province. Prolific production from the Argyle pipe, Kimberley, Western Australia. At the Ekati and Diavik mines, Lac de Gras region, Northwest Territories, Canada.

Name: A corruption of the Greek for *invincible*.

Type Material: Natural History Museum, Paris, France, Haiüy 6599.

References: (1) Palache, C., H. Berman, and C. Frondel (1944) Dana's system of mineralogy, (7th edition), v. I, 146–151. (2) (1953) NBS Circ. 539, 2, 5.