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SYNTHESIS OF THE WURTZITE FORM OF SILICON CARBIDE

Sir:

We have found that the product of the thermal decomposition at 1500 ± 50° of 0.006 mole fraction CH_3SiCl_3 in H_2, at a flow rate of 1200 ml./min., contains crystals of the long-missing wurtzite form of silicon carbide. The crystals were deposited on the graphite wall of the furnace tube, as clusters of transparent blue, green, or colorless prismatic needles. The crystals are often stepped, and often have globular masses of cubic silicon carbide at one or both ends, or at the discontinuities in the stepped crystals. The longest crystals are 2–3 mm. in length and up to 0.2 mm. in diameter. Prism, pyramid, and basal faces are observed on some of the larger crystals. The needles show high birefringence typical of α silicon carbide, and parallel extinction indicating the c axis to be along the needle axis.

X-Ray rotation, Laue, Weissenberg zero and upper-level photographs have been taken with a number of the crystals, using Cu and Mo radiation. The crystals have been rotated about both the a and c axis, and all results are consistent with the wurtzite or (in the nomenclature of Ramsdell[1]) the 2H structure.[1] The unit cell dimensions, as measured from a Weissenberg photograph with a crystal rotating about the a axis, are $a = 3.076$, $c = 5.048$ Å. The space group is $P6_3mc$. The interplanar spacings, measured from a powder photograph of the material, may all be indexed on the basis of the above cell; however, intensity measurements have not as yet been made. The measured lines account for 23 of the 26 possible reflections for the 2H structure which are accessible with Cu radiation.

The apparent reason for the failure to find 2H silicon carbide until now is probably that nearly all investigators have limited themselves to study of crystals grown in the commercial silicon carbide furnaces, where, presumably, conditions are not favorable for growth of the 2H form. One fact now apparent is that α-SiC can be grown at relatively low temperatures where only β-SiC was previously thought to be formed. Complete details of the synthesis, and the crystallographic measurements, will be reported later.

(1) L. S. Ramsdell, *Am. Mineral.*, **32**, 64 (1947).

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