11. REAL AND IDEAL CRYSTALS

11.2 MEASUREMENT OF LATTICE PARAMETER DIFFERENCES WITHIN A MIXED-HABIT NATURAL DIAMOND BY SYNCHROTRON DOUBLE-CRYSTAL TOPOGRAPHY. By A.R. Lang, G. Kowalski, A.P.W. Makepeace, K.H. Wils, Physics Laboratory, University of Bristol, U.K. and Morton Moore, Physics Department, Royal Holloway and Bedford New College, University of London, Egham, Surrey, U.K.

Among natural diamonds which have had epochs of mixed-habit growth during which crystallization proceeded simultaneously on normal (111) facets and on non-faceted 'cuboid' surfaces of mean (100) orientation, there is evidence of a higher level of nitrogen incorporation in the (111) compared with the cuboid growth sectors, at least as far as nitrogen aggregation in 'A' defects (probably a pair of nitrogen atoms substituting for a pair of carbon atoms), 'B' defects (probably four substituted nitrogen atoms tetrahedrally surrounding a carbon vacancy), and platelet precipitates on diamond (100) planes are concerned. The increase of lattice constant, \( a \), with increasing concentration of nitrogen in A-defect form is known, \( \Delta a/\Delta N = 10^{-5} \) for 200 ppm N (Kaiser & Bond, Phys. Rev. 115 (1959) 657-663). However, the effect on lattice constant of B defects, and of platelets of a given size and concentration, is unknown. Measurements have now been made of the ratio \( \Delta a/\Delta N \) (cuboidal) \( \Delta a/\Delta N \) (cuboidal) of double-crystal topographs at the SRS, Daresbury, on a particularly interesting mixed-habit specimen whose growth morphological features have been described by Suzuki & Lang (J. Crystal Growth 29 (1976) 39-37). Its (111) growth sectors have stronger A and B infrared absorptions than the cuboid sectors, and much stronger infrared absorption attributable to platelets. On the basis of the excess A absorption alone, \( \Delta a/\Delta N = 2 \times 10^{-5} \) is expected. The observed value was about three times greater, suggesting a strong contribution from platelets and possibly also from B defects.

11.3 X-RAY STUDY OF BRAZILIAN AMETHYST. By Z. Bararti, K. Goduwod and T. Garminski, Institute of Physics, Polish Academy of Sciences, Warsaw, Poland. [Note: the text is not complete and contains a typographical error.]

The physical nature of the lamellar structure observed on an unprocessed natural rhombohedral growth face, \( r, (0111) \) of Brazilian amethyst quartz was studied by X-ray divergent beam reflection topography and double crystal topography combined with polarized light optical microscopy. The lamellar structure which was formed during growth, was found to be due to polysynthetic Brazil twins and the stripes observed on X-ray topographs identified with the right and left handed individuals of the twins observed optically. Lattice spacing and lattice rotation fluctuations over the areas where the lamellae outcrop on the natural face were measured using double crystal topography. Detailed studies of the concentration of some impurities at the twin boundaries were performed using quantitative electron probe microanalysis. The results indicated that the distortions of the lattice around twin boundaries were not caused by the impurities. The observed contrast at the twin boundaries shows a contraction of the lattice spacing equal to \( 4d/d = -2 \times 10^{-5} \) between the twin lamellae and the twin boundary layer which plays the role of an accommodation layer. Since the distortions of the lattice around the twin boundaries are not caused by impurities, they are to be associated with the atomic displacements necessary to minimize the accommodation energy.