FIGURES
Captions of the figures

Fig. 1 Surface of a simple cubic lattice; A, kinks in the ledge; B, adsorbed molecule; C, vacancies; D, adjacent pair of adsorbed molecules.

Fig. 2 Successive stages in the development of a growth spiral.

Fig. 3 The structure of topas.

Fig. 4 Configuration of atoms in topas close-packing lattice.

Fig. 5 Clinographic projection of the (idealised) structure of the $\left[\text{B}_4\text{O}_5(\text{OH})_4\right]^{2-}$ ion in borax.

Fig. 6 The structure of borax
(a) linkage of Na$_2$(H$_2$O)$_6$ octahedra into chains of composition Na$(\text{H}_2\text{O})_4$
by sharing water molecules.

(b) linkage of B$_4$O$_5$(OH)$_4$ anions into chains by means of hydrogen bonds.

Fig. 7 Co-ordination of the water molecules, hydroxyl groups and oxygen atoms in the structure of borax.

Fig. 8 The structure of borax
(a) projection on (100)
(b) projection on (010).

Fig. 9 The structure of borax projected on (001).

Fig. 10 Vacuum coating unit.

Fig. 11 Vickers projection microscope.
Fig. 12
Carl Zeiss Jena.
Electron microscope EF-4.

Fig. 13
Habits of topaz.

Fig. 14
Rectangular hillocks having longer sides parallel to e-axis. X 100.

Fig. 15
Rectangular hillocks having longer sides perpendicular to e-axis. X 175.

Fig. 16(a)
Eccentric hillocks having one side steeper than others. X 100.

Fig. 16(b)
Interferogram over the region of fig. 16(a). X 100.

Fig. 17
A square hillock having its centre of initiation on the edge of the face. X 100.

Fig. 18
Densely packed tiny square growth hillocks. X 250.

Fig. 19
Square and rectangular isolated growth hillocks. X 100.

Fig. 20(a)
Growth patterns formed by interaction of growth hillocks. X 55.

Fig. 20(b)
Interferogram over the region of fig. 20(a). X 55.

Fig. 21
Vertical striations parallel to the e-axis. X 55.

Fig. 22
Horizontal striations perpendicular to the e-axis. X 55.

Fig. 23
Rectangular etch pits. X 850.

Fig. 24
Rectangular etch pit having ridge-like bottom.
| Fig. 25 | Rectangular flat-bottomed etch pit. | X 1050. |
| Fig. 26 | Etch patterns obtained on \{110\} faces by chemical etching. | X 1050. |
| Fig. 27 | A trapezium-shaped growth hillock. | X 100. |
| Fig. 28 | Tetragonal hillocks with ridge-like tops. | X 350. |
| Fig. 29 | A tetragonal hillock with fairly flat top. | X 100. |
| Fig. 30 | Tetragonal hillocks aligned in a direction parallel to the edge between the dome face and prism face. | X 175. |
| Fig. 31 | Elliptical growth hillocks. | X 100. |
| Fig. 32 | Trapezium-shaped and semi-circular depressions. | X 175. |
| Fig. 33 | A row of trapezium-shaped depressions. | X 350. |
| Fig. 34 | Tiny triangular depressions in isolated regions. | X 350. |
| Fig. 35 | Closely spaced triangular depressions at higher magnification. | X 2100. |
| Fig. 36 | Trapezium-shaped and semi-circular etch pits due to hydrothermal etching. | X 350. |
| Fig. 37 | Tiny triangular etch pits due to hydrothermal etching. | X 850. |
| Fig. 38 | Triangular and trapezium-shaped elevations due to hydrothermal etching. | X 850. |
Figs. 39 and 40  Etch patterns on \{120\} faces due to chemical etching. X 1050.

Fig. 41  A schematic diagram illustrating formation of an almost semi-circular growth hillock.

Fig. 42  Elliptical growth pyramids on \{201\} faces. X 55.

Figs. 43 and 44  Patterns resembling the ranges of mountains. X 55.

Figs. 45 and 46  Dendritic growth forms. X 100.

Fig. 47  Region of fig. 45 after an etch of 15 seconds. X 100.

Fig. 48  Region of fig. 46 after an etch of 15 seconds. X 100.

Fig. 49  Triangular hillocks. X 175.

Fig. 50  Densely populated triangular hillocks. X 175.

Fig. 51  Needle-shaped etch pits. X 175.

Figs. 52 and 53  Triangular etch pits. X 175.

Figs. 54 and 55  Block patterns. X 175.

Fig. 56  A dendritic growth form.

Fig. 57  A triangular elevation inside a triangular depression.

Fig. 58(a)  Etch hillocks X 100.

Fig. 58(b)  Region of fig. 58(a) after 25 seconds of further etching X 100.
Fig. 59(a)  An electron micrograph of etch hillocks shown in fig. 58(a).

Fig. 59(b)  An electron micrograph of etch hillocks of fig. 58(b).

Fig. 60  Rhombus-shaped etch pits. X 1050.

Figs. 61(a) and 61(b)  Matching of grain-boundaries. X 350.

Figs. 62(a) and 62(b)  Regions of figs. 61(a) and 61(b) after an etch of 40 seconds. X 350.

Figs. 63(a) and 63(b)  Matching of oppositely oriented pits. X 350.

Fig. 64  Liquid inclusions. X 350.

Figs. 65(a) and 65(b)  Small inclusions aligned along curved lines. X 350.

Figs. 66(a) and 66(b)  Etch patterns on regions of figs. 65(a) and 65(b). X 350.

Figs. 67(a) and 67(b)  Square, bead-shaped and tree-like inclusions observed through opposite surfaces of thin flake. X 350.

Figs. 68(a) and 68(b)  Etch patterns on opposite surfaces of thin flake. X 350.

Figs. 69(a) and 69(b)  Etch patterns on regions of figs. 68(a) and 68(b) obtained after polishing and re-etching for 40 seconds. X 350.

Figs. 70(a) and 70(b)  Inclusions observed below regions of figs. 69(a) and 69(b). X 350.

Figs. 71(a) and 71(b)  Etch patterns produced on two matched cleavage faces after an etching time of 15 seconds. X 175.
Fig. 72(a) and 72(b) Regions of figs. 71(a) and 71(b) after 30 seconds of further etching. X 175.

Fig. 73(a) and 73(b) Regions of figs. 72(a) and 72(b) after 30 seconds of further etching. X 175.

Fig. 74 Schematic representation of configuration of a dislocation loop.

Fig. 75(a) Etch patterns produced on a cleavage face after an etch of 15 seconds. X 175.

Fig. 75(b) Region of fig. 75(a) after 30 seconds of further etching. X 175.

Fig. 75(c) Region of fig. 75(b) after 30 seconds of further etching. X 175.

Fig. 76 A schematic diagram of different configurations of dislocations. X 175.

Fig. 77(a) Etch patterns obtained on a cleavage face after an etch of 15 seconds. X 350.

Fig. 77(b) Region of fig. 77(a) after 30 seconds of further etching. X 350.

Fig. 77(c) Region of fig. 77(b) after 30 seconds of further etching. X 350.

Fig. 78 A triangular dendrites X 350.

Fig. 79 A hexagonal dendrites X 350.

Fig. 80 Circular dendrites X 175.

Fig. 81 Circular dendrites having outer growth fronts almost hexagonal. X 175.
Fig. 82 A butterfly like structure.  X 175.

Butterfly like structure with complete fanning of rods from the centre of initiation.  X 175.

Fig. 84 Spherulites taken in reflection.  X 100.

Fig. 85(a) Spherulites taken in reflection.  X 100.

Fig. 85(b) Corresponding picture of fig. 85(a) taken in transmitted polarized light.  X 100.

Fig. 86 Tiny crystals with facets.  X 35.

Fig. 87 Tree-like dendrites with needle-like crystals in isolated regions.  X 100.

Fig. 88 A fully grown tree-like structure.  X 100.

Fig. 89 Tree-like dendritic patterns with a small crystallite at the centre X 100.

Tree-like dendritic sprouting at three corners of a hexagonal crystal.  X 100.

Fig. 90 Tree-like dendrites projecting out from all six corners and two sides of a hexagonal crystal.  X 100.

Fig. 92 A growth pyramid with hexagonal outlines.  X 100.

Fig. 93 A growth pyramid having the shape of a parallelogram.  X 100.
Fig. 94  Tiny crystals 1 mm across. X 35
Fig. 95  Platelet crystals of borax. X 25.
Fig. 96  A schematic representation of platelet crystals of different shapes.
Fig. 97  Four-sided polygonal structure having the shape of a parallelogram. X 100.
Fig. 98  Six-sided polygonal structure. X 100.
Fig. 99  Eight-sided polygonal structure. X 100.
Fig. 100(a)  Crystals grown at 20°C. X 10.
Fig. 100(b)  Crystals grown at 25°C. X 10.
Fig. 100(c)  Crystals grown at 30°C. X 10.
Fig. 101  Needle-shaped crystals.
Fig. 102  A clockwise growth spiral X 350.
Fig. 103  Two anticlockwise growth spirals emerging from two closely spaced screw dislocations. X 100.
Fig. 104  A growth hillock formed by three clockwise spirals. X 100.
Fig. 105  A microphotograph of a [111] face illustrating growth spirals on it. X 55.
Fig. 106  An anticlockwise growth spiral on a [001] face. X 100.
Fig. 107  Triangular growth pyramids on a {100} face of needle-shaped crystals X 100.
Fig. 108  Hair-like crystals projecting out from apex of triangular growth pyramids on \{100\} face of a needle-shaped crystal

Fig. 109  Etch patterns on a \{100\} face, X 100.

Fig. 110  Etch patterns on a \{110\} face, X 100.

Fig. 111  Etch patterns on a \{001\} face, X 100.

Fig. 112  Etch patterns on a \{111\} face, X 100.

Fig. 113(a) and 113(b) Etch patterns produced on two matched cleavage faces, X 175.

Fig. 114  A schematic diagram of different configuration of dislocations.