

**The microstructural and metamorphic history  
preserved within garnet porphyroblasts  
from southern Vermont and northwestern Massachusetts**

**VOLUME II**

Thesis submitted by

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## **SECTION C**

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**Chemical zoning anomalies in garnet porphyroblasts  
displaying multiple phases of growth: their formation and  
relationship to textural discontinuities**

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Table C-1: Microprobe garnet analyses

The data presented in this table is the average composition at each point based on three or four microprobe analyses. The full microprobe data is given in Appendix 5 and measurement points are shown on the line diagrams in Figures C-2, C-3, C-5, C-6 and C-7.

**Sample BG62**

	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>SiO<sub>2</sub></b>	37.75	37.31	37.98	37.89	37.80
<b>TiO<sub>2</sub></b>	0.14	0.19	0.04	0.14	0.07
<b>Al<sub>2</sub>O<sub>3</sub></b>	20.61	19.89	20.44	20.26	20.34
<b>FeO</b>	29.22	30.79	32.99	33.19	32.60
<b>MnO</b>	4.33	2.57	1.20	0.97	0.06
<b>MgO</b>	0.89	0.51	0.65	0.92	1.42
<b>CaO</b>	6.99	6.86	6.32	5.79	6.62
<b>Total</b>	99.91	99.12	99.62	99.16	98.90

**Sample BG87**

	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>SiO<sub>2</sub></b>	37.30	37.79	37.70	37.44	37.67	37.94
<b>TiO<sub>2</sub></b>	0.07	0.06	0.06	0.13	0.10	0.10
<b>Al<sub>2</sub>O<sub>3</sub></b>	20.35	20.36	20.31	20.50	20.59	20.80
<b>FeO</b>	32.44	31.36	32.09	32.58	34.50	32.12
<b>MnO</b>	3.00	2.53	2.83	1.67	0.10	2.36
<b>MgO</b>	0.78	0.93	0.13	0.33	1.18	0.64
<b>CaO</b>	5.38	5.80	6.27	6.99	4.80	6.16
<b>Total</b>	99.31	98.85	99.40	99.64	98.94	100.12

	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>
<b>SiO<sub>2</sub></b>	37.18	37.82	36.94	37.18	37.64
<b>TiO<sub>2</sub></b>	0.10	0.13	0.15	0.20	0.17
<b>Al<sub>2</sub>O<sub>3</sub></b>	19.85	20.41	20.12	20.50	21.02
<b>FeO</b>	30.36	30.15	30.49	34.30	34.22
<b>MnO</b>	4.81	4.29	3.96	0.63	0.08
<b>MgO</b>	0.75	1.00	0.95	1.07	1.85
<b>CaO</b>	6.60	6.50	6.56	5.62	5.20
<b>Total</b>	99.65	100.29	99.17	99.50	100.18

**Sample BG107A**

	<b>1</b>	<b>2</b>	<b>3</b>
<b>SiO<sub>2</sub></b>	37.56	37.60	37.70
<b>TiO<sub>2</sub></b>	0.10	0.12	0.02
<b>Al<sub>2</sub>O<sub>3</sub></b>	19.93	20.33	20.33
<b>FeO</b>	28.81	29.63	34.15
<b>MnO</b>	3.25	3.02	0.29
<b>MgO</b>	0.73	0.83	2.41
<b>CaO</b>	8.12	8.12	4.67
<b>Total</b>	98.51	99.64	99.58

**Sample BG108**

	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>SiO<sub>2</sub></b>	37.55	38.24	38.00	38.22	38.34
<b>TiO<sub>2</sub></b>	0.11	0.32	0.14	0.22	0.18
<b>Al<sub>2</sub>O<sub>3</sub></b>	21.06	20.46	20.91	20.66	21.05
<b>FeO</b>	28.75	28.77	31.07	33.15	32.76
<b>MnO</b>	2.94	2.30	3.23	1.17	0.81
<b>MgO</b>	0.96	0.35	0.80	1.01	1.92
<b>CaO</b>	9.04	9.23	6.10	5.91	5.07
<b>Total</b>	100.41	99.68	100.25	100.34	100.11

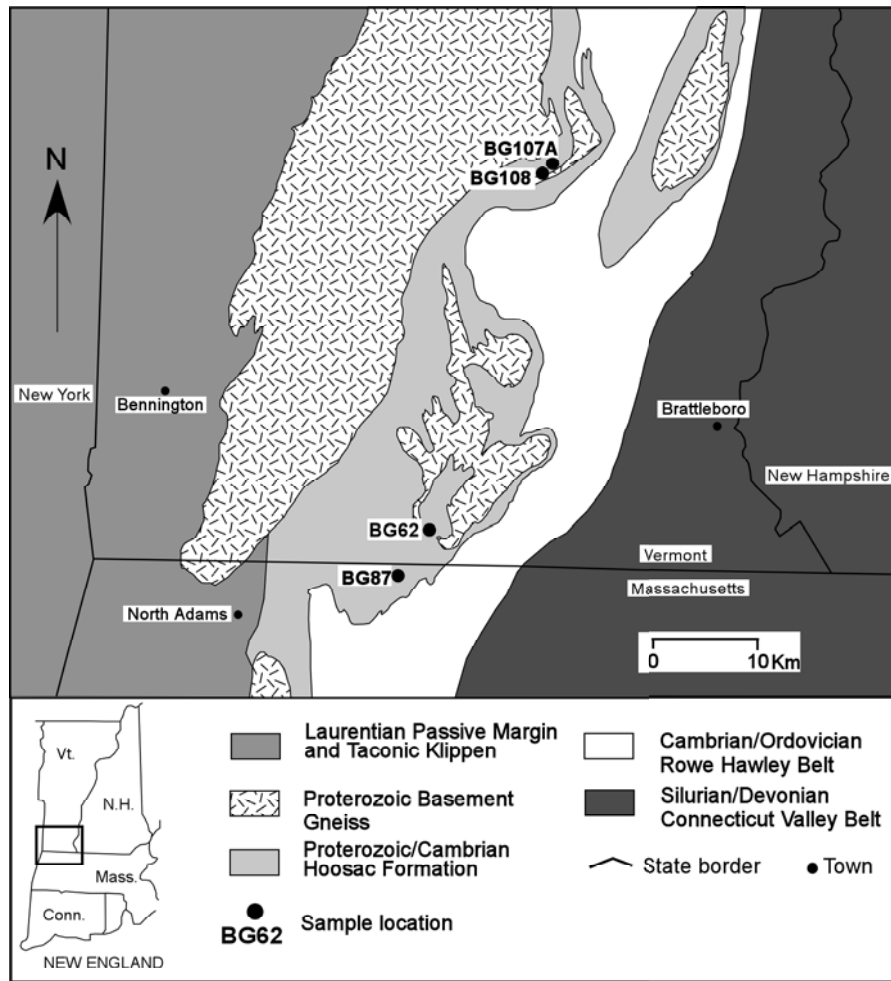


Figure C-1: Map showing the location of samples mentioned in the text. Regional geology based on Doll et al. (1961) and Zen et al. (1983).

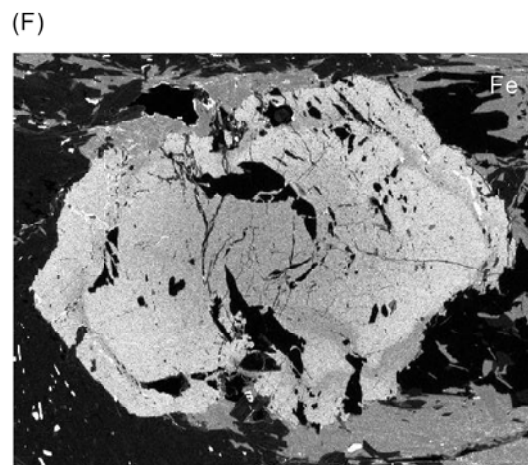
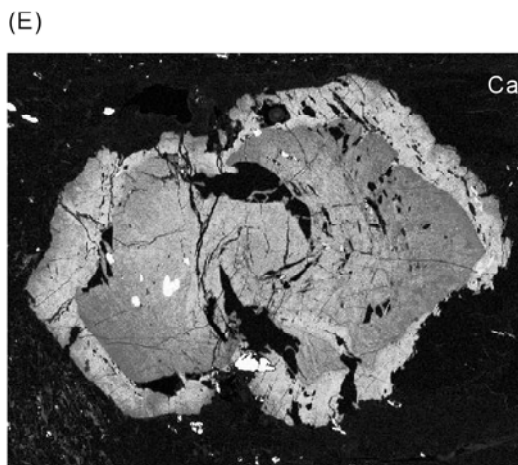
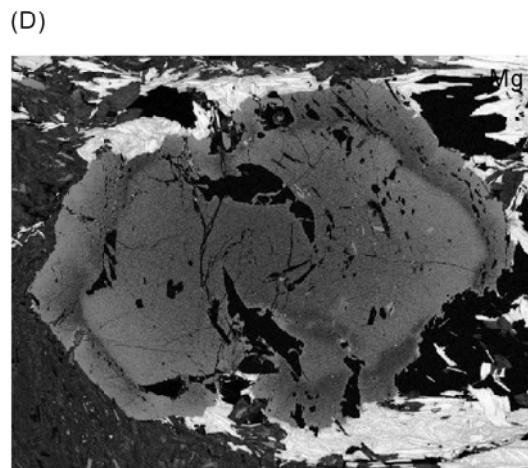
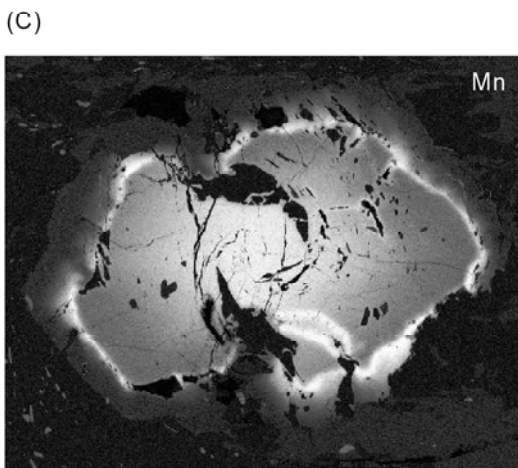
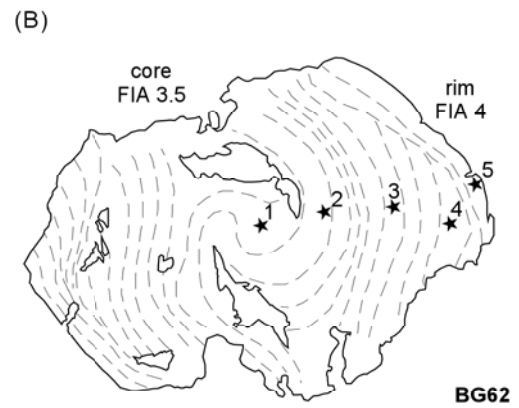
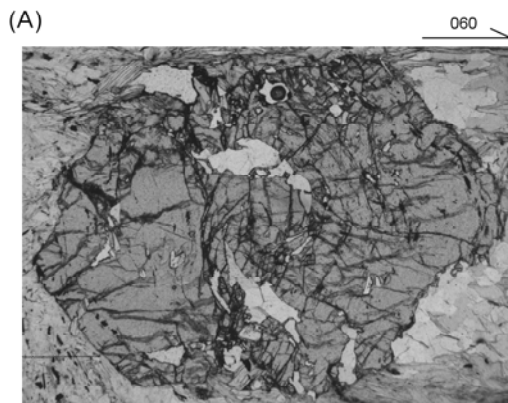


Figure C-2: Images of a garnet porphyroblast from sample BG62. Electron microprobe images show an area 3.6mm x 4.5mm. High counts are white, low counts are black. Images have been individually processed to enhance contrast.

A: Photomicrograph

B: Interpretive line drawing showing inclusion trails. Stars indicate the location of compositional analyses given in Table C-1.

C: Manganese compositional map

D: Magnesium compositional map

E: Calcium compositional map

F: Iron compositional map

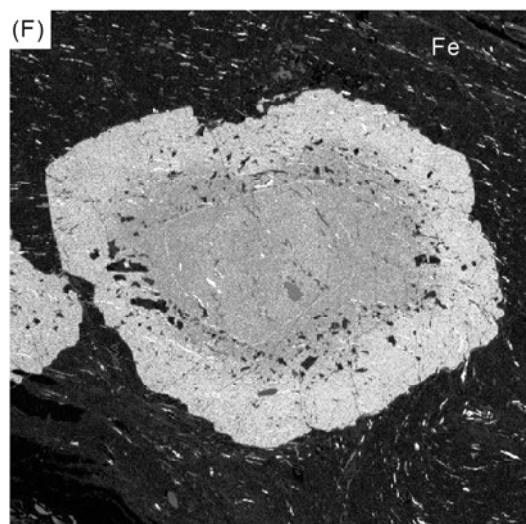
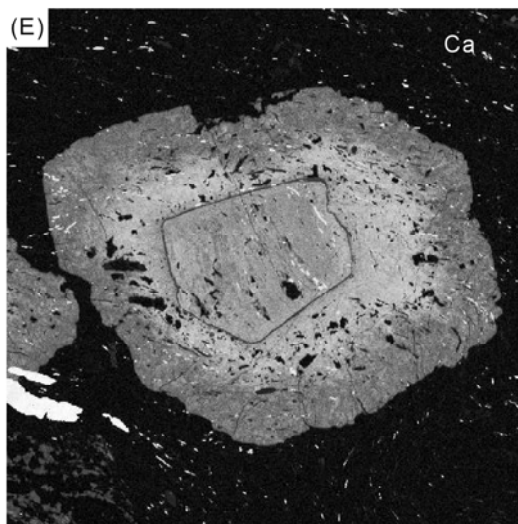
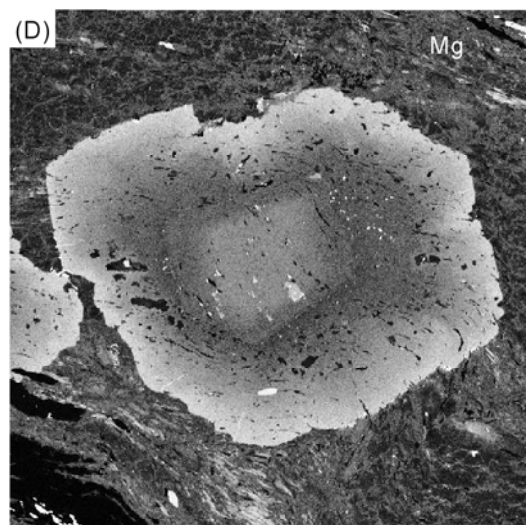
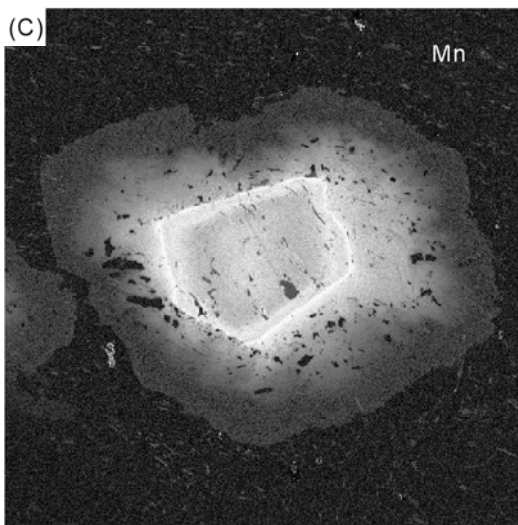
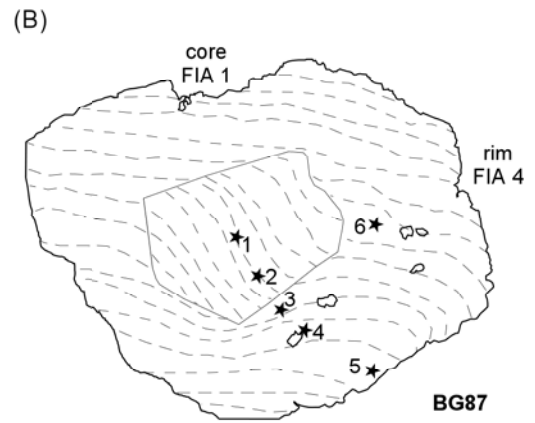
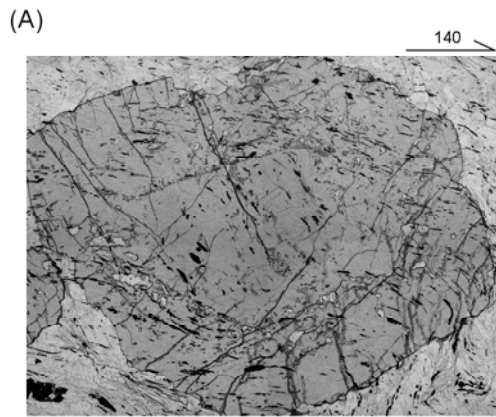


Figure C-3: Images of a garnet porphyroblast from sample BG87. Electron microprobe images show an area 9.5mm x 9.5mm. High counts are white, low counts are black.

Images have been individually processed to enhance contrast.

A: Photomicrograph. Box indicates the area shown in Figure C-4.

B: Interpretive line drawing showing inclusion trails and the core-rim boundary. Stars indicate the location of compositional analyses given in Table C-1.

C: Manganese compositional map

D: Magnesium compositional map

E: Calcium compositional map

F: Iron compositional map

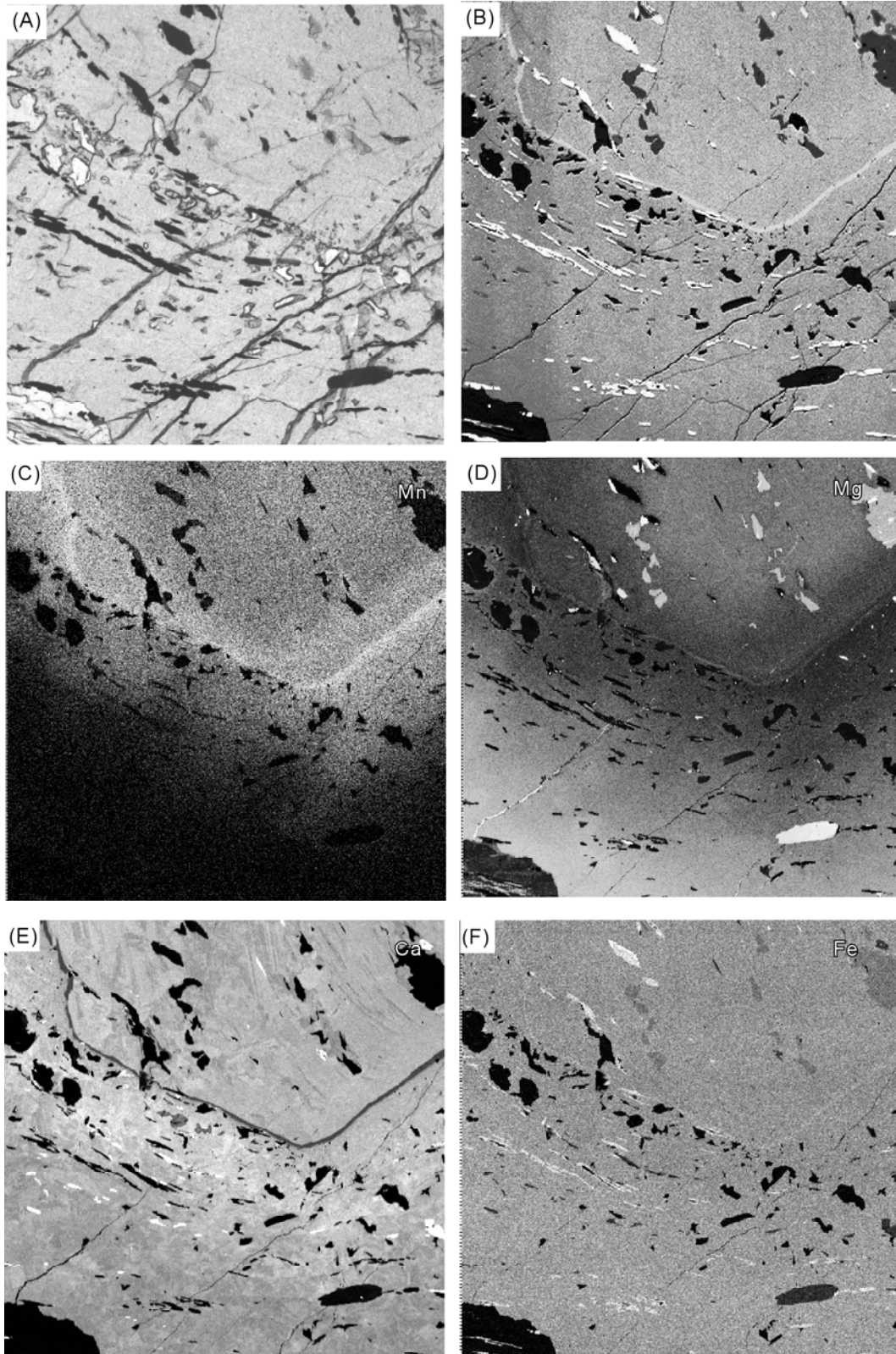


Figure C-4: An enlargement of the bottom right corner of the garnet porphyroblast in Figure C-3 (Sample BG87). Electron microprobe images show an area 2.5mm x 2.5mm. High counts are white, low counts are black. Images have been individually processed to enhance contrast.

A: Photomicrograph

B: Backscattered Electron Image

C: Manganese compositional map

D: Magnesium compositional map

E: Calcium compositional map

F: Iron compositional map

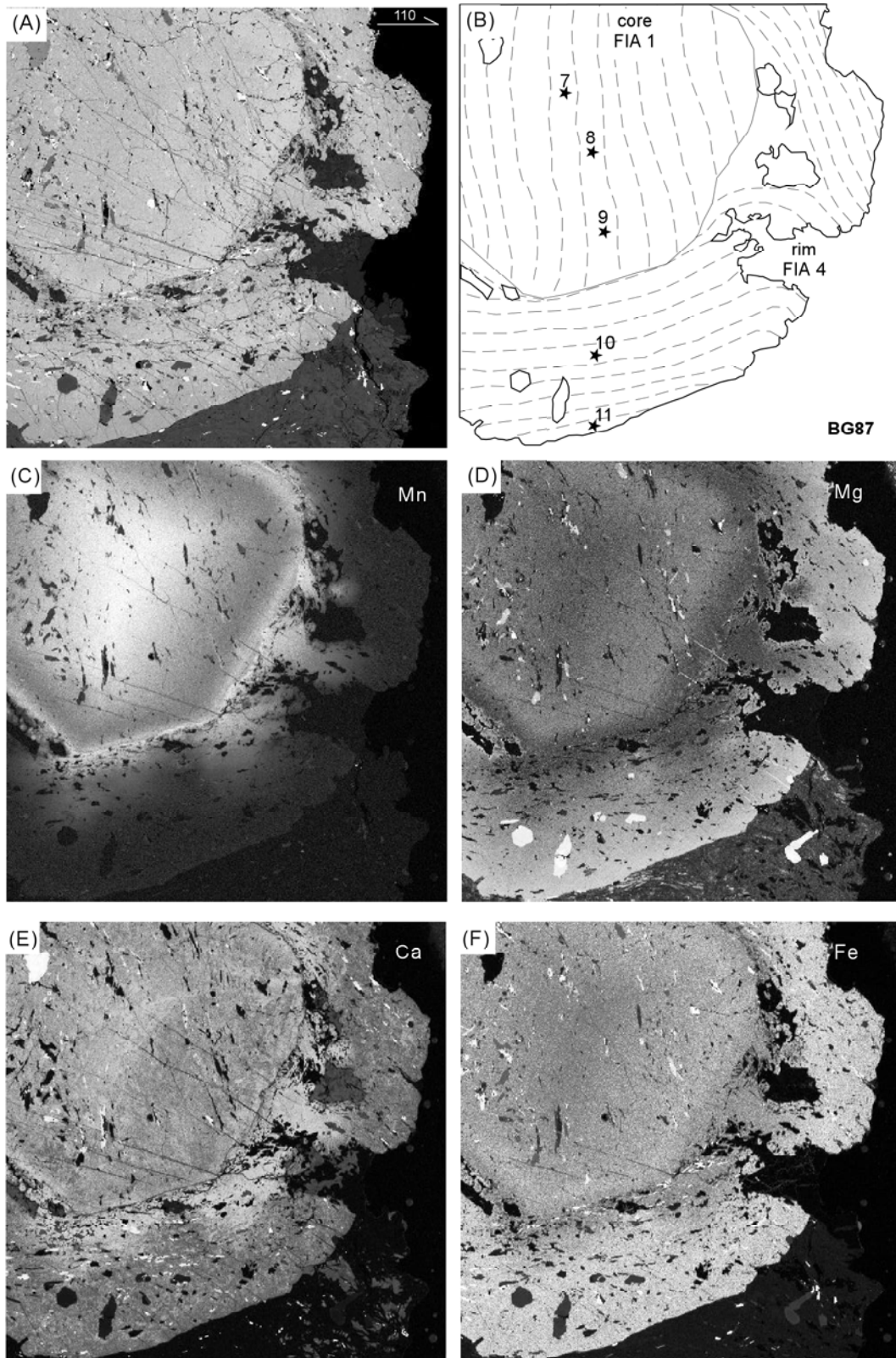


Figure C-5: Images of a garnet porphyroblast from sample BG87. Electron microprobe images show an area 8mm x 8mm. High counts are white, low counts are black.

Images have been individually processed to enhance contrast.

A: Backscattered Electron Image

B: Interpretive line drawing showing inclusion trails and the core-rim boundary. Stars indicate the location of compositional analyses given in Table C-1.

C: Manganese compositional map

D: Magnesium compositional map

E: Calcium compositional map

F: Iron compositional map

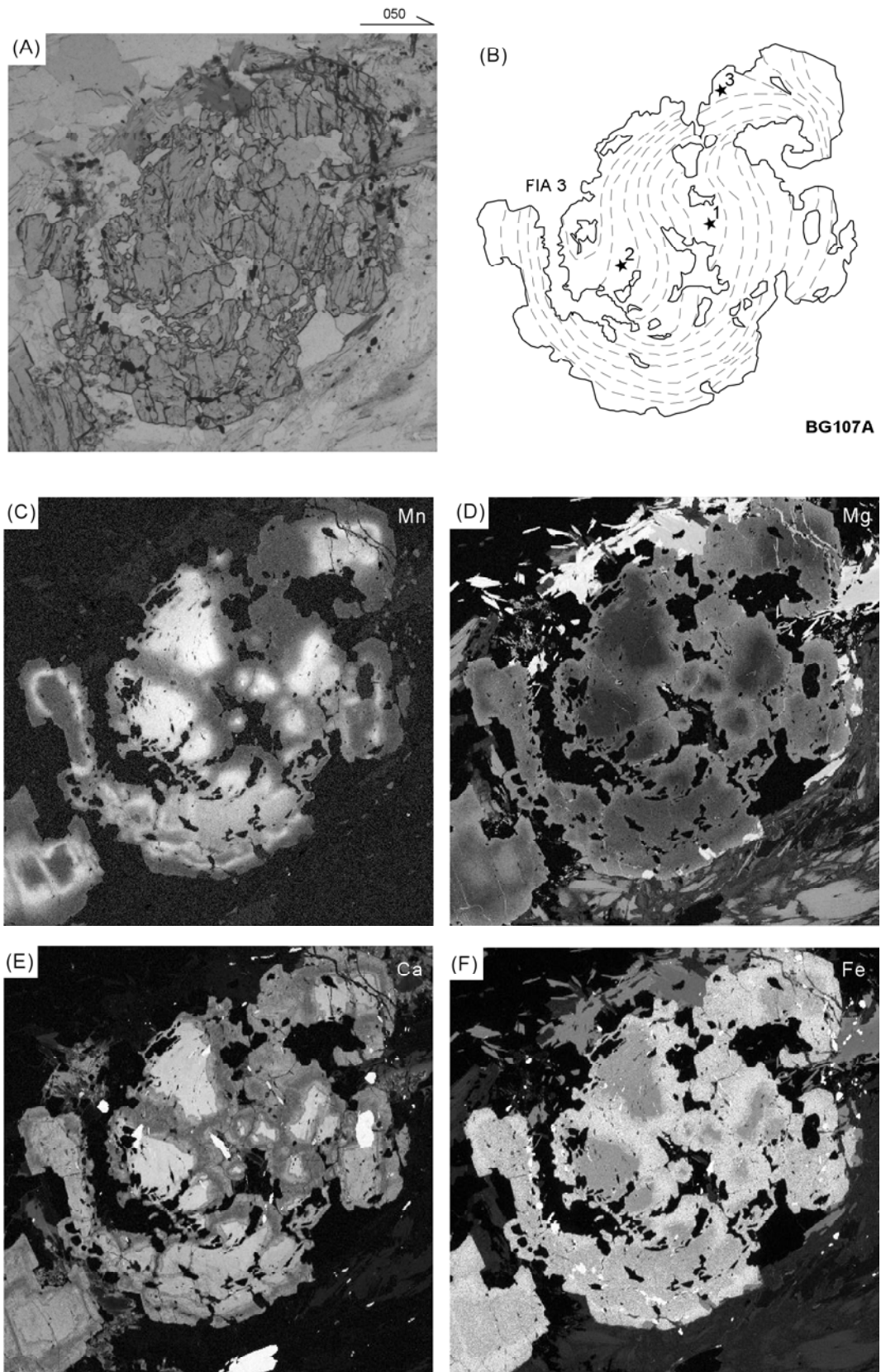


Figure C-6: Images of a garnet porphyroblast from sample BG107A. Electron microprobe images show an area 3mm x 3mm. High counts are white, low counts are black. Images have been individually processed to enhance contrast.

A: Photomicrograph

B: Interpretive line drawing showing inclusion trails. Stars indicate the location of compositional analyses given in Table C-1.

C: Manganese compositional map

D: Magnesium compositional map

E: Calcium compositional map

F: Iron compositional map

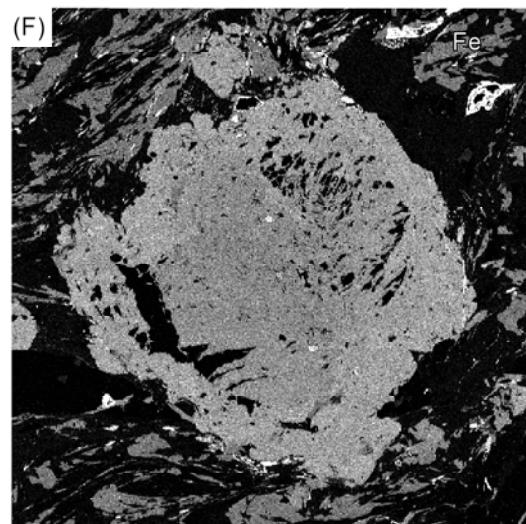
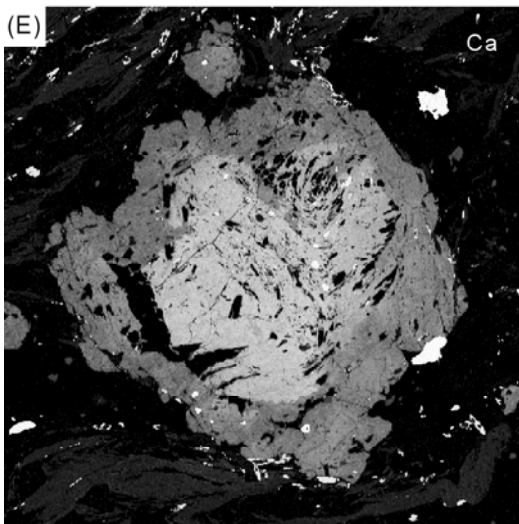
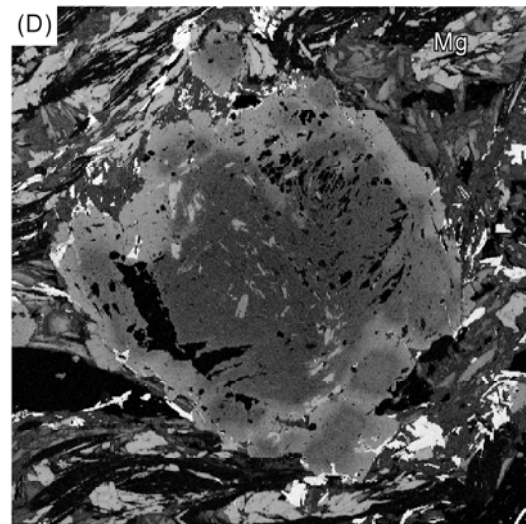
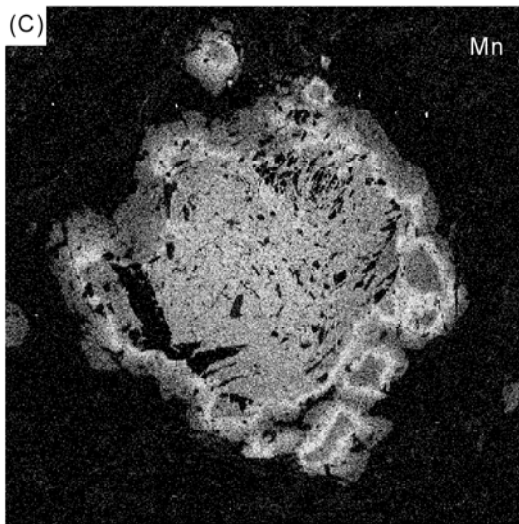
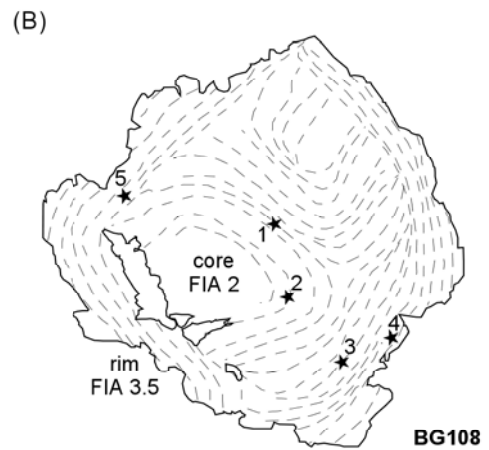
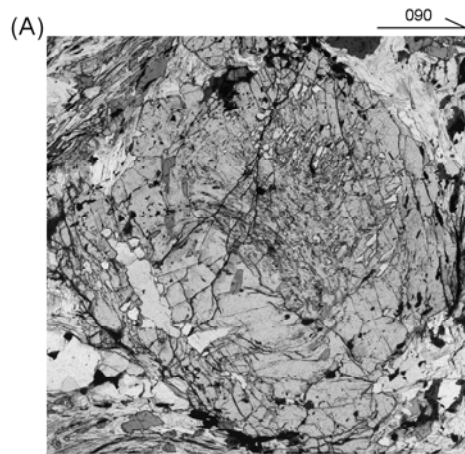


Figure C-7: Images of a garnet porphyroblast from sample BG108. Electron microprobe images show an area 6mm x 6mm. High counts are white, low counts are black. Images have been individually processed to enhance contrast.

A: Photomicrograph

B: Interpretive line drawing showing inclusion trails. Stars indicate the location of compositional analyses given in Table C-1.

C: Manganese compositional map

D: Magnesium compositional map

E: Calcium compositional map

F: Iron compositional map

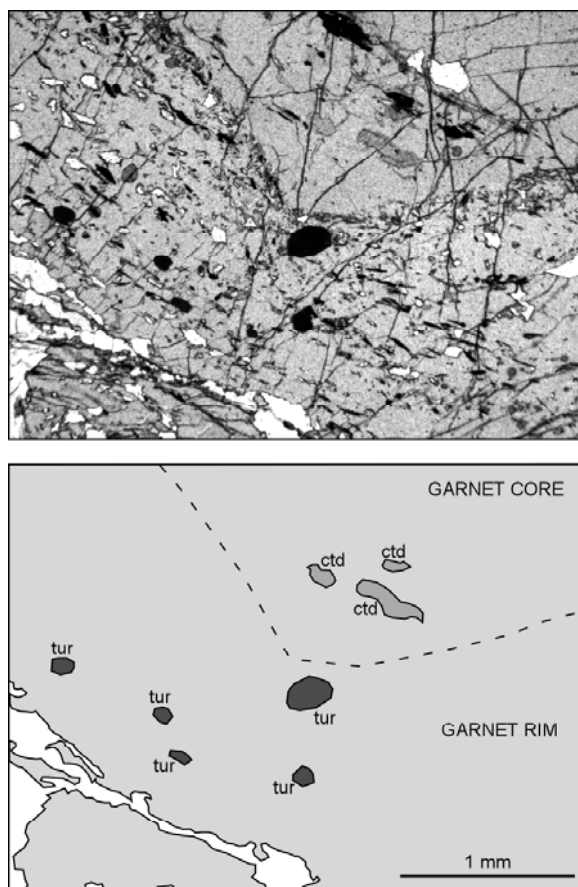


Figure C-8: Photomicrograph showing part of a garnet porphyroblast from sample BG87. Note the chloritoid (ctd) inclusions in the porphyroblast core. Chloritoid inclusions are absent from the rim and the matrix. Note also the tourmaline (tur) inclusions in the porphyroblast rim. Tourmaline is absent from the porphyroblast core.