

Two-Stage Growth of Porphyroblastic Biotite and Garnet in the Barrovian-type Metapelites of the Imjingang Belt, Central Korea

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Barrovian-type metapelites of the Imjingang belt, ranging in grade from garnet through staurolite to kyanite zones, record three major episodes of deformation: (1) initial contractional deformation (D_{n-1}); (2) penetrative deformation (D_n) producing major foliation; and (3) extensional ductile shearing. Porphyroblastic biotite and garnet primarily of garnet-zone metapelites were investigated for unraveling their parageneses and growth mechanisms. Both biotite and garnet have grown at two different stages. Biotite porphyroblast started to form between D_{n-1} and D_n , but its margin grew during D_n . Initial growth of garnet was post- D_{n-1} , and took place predominantly during D_n . Overgrowth of garnet at the expense of biotite was post- D_n . The initial growth of poikiloblastic biotite and garnet was accomplished by chemical replacement of the matrix. Biotite porphyroblasts overgrew by crack-filling mechanism, facilitated by extensional crack accompanying non-coaxial shearing. The garnet overgrowth, highlighted by pseudomorphic replacement after biotite, resulted from the force of crystallization. The presence of these microstructures even in kyanite-zone metapelites suggests that the two-stage growth of biotite and garnet is ubiquitous in the Barrovian-type metapelites.