

Porphyroblast microstructures: A review of current and future trends

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ABSTRACT

Many recent papers show how porphyroblast microstructures play an important role in a wide range of structural and metamorphic studies. This paper reviews ten current applications of these microstructures: (1) porphyroblast growth-timing criteria; (2) tracking progressive foliation development relative to changing metamorphic conditions; (3) timing of pluton emplacement relative to deformation and metamorphism; (4) finite longitudinal strain determinations; (5) kinematics and porphyroblast rotation; (6) use of linear fabrics preserved in porphyroblasts; (7) porphyroblasts and folding mechanisms; (8) inclusion-trail orientations and orogenic processes; (9) inferring shear-strain rates from porphyroblast growth rates; and (10) in-situ age determinations. Although there is still no consensus on the interpretation of some porphyroblast microstructures, a bright future lies ahead as traditional and newly developed techniques of microstructural analysis are combined with modern chemical and microprobe techniques to provide an increased understanding of the relationships between deformation and metamorphism in a wide range of metamorphic settings.