Tourmaline concentrations in migmatitic metasedimentary rocks of the Riziana and Kolchiko areas in Macedonia, Northern Greece

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Abstract: Tourmaline from the migmatitic metasedimentary rocks of the Serbo-macedonian massif of the Riziana and Kolchiko areas in Macedonia (Northern Greece) exhibit features that relate to the evolution of regional metamorphism and deformation. Tourmalines are found as megacrysts within anatectic pegmatitic leucosomes or as coarse-grained crystals within felsic bands in the metamorphic rocks. Associated minerals within the leucosomes or the felsic bands include quartz, plagioclase, feldspar, mica and apatite, with minor titanite, garnet, carbonates and opaques. Tourmalines are black and form discrete prismatic crystals up to 7 cm in size, or occur as anhedral poeciloblastic grains, or polycrystalline aggregates. Many of the tourmaline grains display a concentric colour zoning, while some are unzoned, diffusely zoned, or show patchy colour domains. Zoned tourmaline grains have light blue-green cores and olive-brown-green rims and chiefly belong to the schorl-dravite solid-solution series, displaying more schorlitic cores (Fe > Mg). Field, textural and chemical data support a pre-metamorphic origin of tourmaline from boron-rich partial melts or fluids rather than crystallization of porphyroblasts during regional metamorphism. Following their initial development, a complex sequence of deformational and metamorphic events have significantly modified the texture of the host rocks. Because of the highly refractory nature of tourmaline, the concentric texture and chemical zonation are interpreted as preserved primary growth features. However, tourmaline outer rims should be viewed as metamorphic, with a composition that has been partially reset during metamorphism. The poeciloblastic form, the polycrystalline domains and the diffuse zoning, as well as the penetrative fabric of the host rock, are all due to syntectonic metamorphic recrystallization.

Key-words: tourmaline, Kolchiko, Riziana, schorl-dravite, metasedimentary rocks, Northern Greece.

Introduction

Tourmaline is the most common borosilicate accessory mineral occurring in a variety of different rock-types. Granitoid intrusive rocks and their associated aplite-pegmatitic bodies or hydrothermal aureoles commonly contain significant amounts of tourmaline (e.g., Power, 1968; Neiva, 1974; Black, 1971; Shearer et al., 1984; Fortey & Cooper, 1986; Nemec, 1989). In addition, tourmaline is found in metamorphic rocks with a wide range of bulk compositions and developments at all metamorphic grades (e.g., Vrana, 1979; Slack et al., 1984; Henry & Guidotti, 1985; Waters & Moore, 1985; Plimer, 1986; Povondra & Novak, 1986; Grew, 1988; Slack & Coad, 1988; Willner, 1992).

The petrologic significance of tourmaline has recently attracted more and more attention (Manning, 1982; Slack et al., 1984; Taylor & Slack, 1984; Shearer et al., 1984; Henry & Guidotti, 1985; Jolliff et al., 1986; Bone, 1988; Kassoli-