INTRODUCTION

Aluminous granulites are keys to understanding the tectono-thermal history of high-grade terranes, particularly those that have experienced ultrahigh-temperature (UHT) metamorphism because of the presence of many reaction textures mostly developed during retrograde evolution of the rocks (Harley 1998). These textures are conventionally interpreted in appropriate petrogenetic grids to deduce the retrograde pressure-temperature history of the rocks. Locally, sapphireine, overgrowing spinel, is also intergrown with garnet. Three possible mechanisms are discussed to account for the garnet-spinel intergrowth: (1) from early stabilized orthopyroxene + sillimanite; (2) spinel forming pseudomorphs after early sillimanite inclusions in garnet; and (3) from an early stabilized hypothetical, highly aluminous orthopyroxene involving a complex reaction between the (Fe,Mg)-Tschermak and Fe³⁺-Tschermak components. Sapphirine is produced by a reaction involving spinel and aluminous pyroxene. Regardless of the exact mechanism, available thermodynamic data suggest that all such reactions presumably occurred due to loading and/or heating during prograde metamorphism consistent with the conclusion from the other domain. Such an intergrowth texture has not been reported previously in aluminous granulate parageneses, but these could provide crucial information regarding the prograde segment of the metamorphic evolution of deep crustal rocks.

Keywords: garnet-spinel intergrowth, early aluminous orthopyroxene, prograde path for UHT rocks, Eastern Ghats, India

BACKGROUND GEOLOGY

The Eastern Ghats Belt (Fig. 1) is a regional granulite terrane that was affected by tectono-thermal events ranging in age from at least Meso- to Neoproterozoic time. It constitutes a crucial crustal block of the Proterozoic East Gondwana (Dobmeier and