

Fluid characteristics of ultrahigh-temperature metamorphism along the Gondwana suture: evidence from fluid inclusions

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Fluid inclusions trapped in high-grade minerals from several UHT localities in the Palghat-Cauvery Shear Zone System (PCSZ), which corresponds to an extensive crust-scale shear zone in southern India, have been examined in detail to infer the role of fluids in the extreme metamorphism along the Gondwana suture zone. Primary and pseudosecondary fluid inclusions trapped in various high-grade minerals show melting temperatures close to the triple point of pure CO₂. Homogenization temperatures of most of the inclusions range from +12.1 to +30.3 °C, which translate into a wide range of CO₂ densities of 0.59 to 0.84 g/cm³. The isochores computed for the carbonic inclusions show significantly lower pressure conditions than the prograde to peak pressure conditions estimated for this area. In contrast, a rare group of high-density inclusions indicate high-pressure conditions for trapping. It is inferred that most inclusions probably underwent significant density reversal during decompression. The finding of pure CO₂ inclusions in granulites from several localities in the PCSZ suggests that carbonic fluids were instrumental in stabilizing the regional UHT metamorphic mineral assemblages along this Gondwana suture.