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p-T-X characteristics of the formation conditions of hydrothermal originated monazite of the Jolotca ore field, Ditrău Alkaline Massif (Romania).

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The Jolotca ore field of the Ditrău Alkaline Massif is one of the potential REE deposits of Europe [1]. It exhibits a diverse REE mineral assemblage, including REE-phosphates, REE-silicates, and REE-carbonates [2]. The principal REE ore is monazite, which forms veins of mm-cm thickness, while xenotime, which is in association with it, is only observed in very small quantities. The most common form of monazite is fan-shaped and/or bow-tie like crystal aggregates, made up of columnar crystals. The chemistry of monazite, in particular its Th and U content, suggests its formation from hydrothermal fluids. Using an Y-based multicomponent solvus thermometer [3], the crystallization temperature of monazite of hydrothermal origin was obtained to range from 244±14 to 396±17 °C. In order to establish more appropriately the *p-T-X* characteristics of monazite formation, fluid inclusions entrapped in monazite were analysed in detail. Three fluid types were detected in monazite: (1) H_2O-NaCl-CO_2; (2) H_2O-NaCl; and (3) H_2O-NaCl-$CaCl_2$. The first two types contain low to moderate salinity (4-21 wt% $NaCl_{eq.}$) fluid, with 2-5 mol% CO_2 content in the former, and both types were detected in primary (P) and secondary (S) inclusions; whereas, the third type was detected only in secondary inclusions. Homogenization temperatures are in the 150-412 °C range (median: 265 °C) concerning the (1) and (2) fluid types in both P and S inclusions, while in the case of type (3), 148-237 °C (median: 174°C) was observed. Based on mineral chemistry, solvus thermometry and fluid inclusion data, the monazites of hydrothermal origin of the Jolotca ore field were precipitated from chloride-dominant, medium salinity, CO_2-poor fluids at <400 °C temperature.

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