Magmatic-Hydrothermal Evolution and Li Mineralization in Pegmatite: Constraints from Composition of Garnet from Kelumute No. 112 Pegmatite, Xinjiang Autonomous Region, China

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Abstract: The Kelumute No. 112 pegmatite hosts a complex Li-Be-Nb-Ta ore deposits which ranges in the secondary scale in Altay, Xinjiang Autonomous Region, China. Compositions of garnet from its five mineral assemblage zones have been determinated by electron probe microanalysis (EPMA) in this work. Results reveal that all garnet from No. 112 pegmatite belongs to almandite-spessartite series with high proportion of spessartite. Composition of garnet shows similarity in the same zone and discrepancies in different zones with an increasing trend of Fe and a decreasing trend of Mn from early to late formation. Combined with the similar variation trend of Fe and Mn in apatite and columbite-tantalite, exsolution of the F-rich fluid phase from the evolved silicate melt during the magmatic-hydrothermal stage inducing variation in composition of garnet was identified in No. 112 pegmatite-forming melt. Garnets from the five zones of No. 112 pegmatite show a high spessartite proportion of 64% ~ 90%, which is consistent with compositions of spessartites from super large and large scale worldwidely pegmatitic Li ore deposits, we thus to conclude that spessartite with high MnO content could be an effective mineral indicator for exploring pegmatitic Li ore deposits.

Keywords: garnet; magmatic-hydrothermal evolution; Li mineralization; pegmatite; Xinjiang