A comparative study of leucogranites and migmatites from the GHC in Nyalam, Southern Tibet

LEI YANG*, FUYUAN WU, JIAMIN WANG AND XIAOCHI LIU

Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing 100029, China
(*correspondence: yanglei415@mails.ucas.ac.cn)

Miocene leucogranite and migmatite are some of the most studied features of the Himalayan-Tibetan Orogen, which record crustal melting in an ongoing continental collision zone. We obtained data of mineralogy and geochemistry on migmatite and leucogranite from the GHC in Nyalam, Southern Tibet, attempt to explore the petrogenesis link between them. Abundance biotites appear but primary muscovite is rare in melanosome. Meanwhile, it is easy to find sillimanite needles ally with k-feldspar. Combine with the geochemistry of leucosome, we suggest that the migmatite experienced muscovite-dehydration partial melting.

By comparing mineralogy and geochemistry of leucosome with leucogranite, we demonstrate that there is a significant difference between them: (i) plagioclase and biotite in leucogranite are albite and siderophyllite respectively, while in leucosome are oligoclase and Fe-biotite; (ii) rare metal content (Li, Be, Cs, Sn and Ta) in leucogranite is one order of magnitude higher than in leucosome; (iii) leucosome has positive Eu anomalies or no-Eu anomalies (δEu=0.93~2.61) while leucogranite has obviously negative Eu anomalies (δEu= 0.47~0.70). These differences indicate that the leucogranite may be an evolved melt experienced fractional crystallization. When we choose the leucosome which did not be influenced by fractionated crystallization and residuum entrainment as initial melt, the trace element modelling predicts that the content of rare metal elements of leucosome need at least 90% fractionated crystallization to reach the level of leucogranite. However, mass balance indicates that the degree of partial melting of migmatite was too less (0.2) to afford extensive fractionated crystallization. Therefore, we prefer that the migmatite could not be the source of leucogranite in Nyalam, and they could not be easily referred to collectively as identical anatectic rocks.