IRANIAN SOCIETY of CRYSTALLOGRAPHY and MINERALOGY

Vol. 26, No. 2, Summer 1397/2018

IRANIAN JOURNAL of CRYSTALLOGRAPHY and MINERALOGY

U-Pb age dating on zircon crystals, Sr-Nd isotope ratios and geochemistry of Neogene adakitic domes of Quchan-Esfarayen magmatic belt,NE Iran

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(Received: 12/7/2017, in revised form: 28/10/2017)

Abstract: Quchan- Esfarayen magmatic belt (north of Sabzevar) include Neogene adakitic domes with andesite to rhyolite in composition which is cut by Jurasic sedimentary rocks, Eocene volcano-sedimentary rocks, Miocene sedimentary rocks and even occasionally Peliocene conglomerate. The main minerals of these rocks are plagioclase and amphibole with various textures such as felsitic porphyry, microlitic porphyry, glomero porphyry, sieve and flow textures. The calc-alkaline and metaluminous to peraluminous nature, enrichment in large ion lithophile elements (LILEs) and light rare earth elements (LREE) and depletion in heavy rare earth elements (HREE) in primitive mantle and chondrite normalized spider diagrams, along with high contents of Na_2O, Al_2O_3, Sr, high ratio of Sr/Y and low ratio of K_2O/Na_2O and depletion in HFSEs in these rocks are characteristics of the young arc volcanics. Furthermore, these rocks display initial $^{87}Sr/^{86}Sr$ ratios of 0.70390 to 0.70562 and εNd(t) values of -0.86 to +4.98 respectively, which show that they are originated from partial melting of oceanic slab with crustal contamination. Emplacement age of these rocks into the quchan-Esfarayen magmatic belt obtained with U–Pb dating on separated zircons of 17.83±0.24 to 8.50±0.34 Ma. The results show that parental magma of the rocks generated by partial melting of a garnet-amphibolitic to eclogitic subducted Sabzevar Neo-Thethyan oceanic slab underneath the Binaloud continental lithospher. Presence of continental metamorphic and sedimentary xenoliths, corrosion and chemical disequilibrium of the phenocrysts and their sieve textures in plagioclase along with Sr-Nd isotopic ratios in these rocks indicate the operation of differentiation crystallization, assimilation and crustal contamination (AFC) in the genesis and evolution of igneous rocks of this belt.

Keywords: *Geochemistry; age dating; adakitic domes; subduction; Neo-Thethys; Quchan Sabzevar.*

متن فارسی اصل مقاله از صفحه ۴۵۵ تا ۴۷۸ در این شماره به چاپ رسیده است.

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