ASLC2-162

A-type Granite of Peninsular Malaysia and Comments on Tectonic Setting

AZMAN A GHANI

Geology Department, Faculty of Science,
University of Malaya, 50603 Kuala Lumpur Malaysia
Email: azmangeo@um.edu.my

The granitic rocks of Peninsula Malaysia traditionally been divided into two provinces, i.e., Western and Eastern provinces, correspond to S– and I–type granite respectively. The Western province granite is characterised by megacrystic and coarse–grained biotite, tin–mineralised, continental collision granite, whereas, the Eastern Province granite is bimodal I–type dominated by granodiorite and associated gabbroic of arc type granite.

Recently, new A type granite have been reported by Ghani et al. 2014 in Besar island group (Besar, Tengah and Hujung islands) SE Johor. The main granite from the three islands (with average %) consist of K-feldspar (40%), plagioclase (20%), quartz (35%), biotite (<5%), amphibole (trace), apatite (trace), zircon (trace), sericite and chlorite. The granite is characterized by shallow level emplacement texture such as abundant granophyric. Quartz in the granophyric texture displays various shapes from rounded elongate to square to worm-like to tiny rounded shapes. The granite is highly felsic with SiO_2 ranging from 75.70% to 77.90% (differentiation index = 94.2 to 97.04), weakly peraluminous (average ACNK=1.02), normative hypersthene ranging from 0.09 to 2.19% and high alkali content (8.32 to 8.60%), high Ga, FeT/MgO and low P, Sr, Ti, CaO and Nb. All rock samples plot in the A–type field in FeOt/MgO vs Zr+Nb+Ce+Y, (b) (Na_2O+K_2O)/CaO vs. Zr+Nb+Ce+Y, (c) K_2O/MgO vs. 10000*Ga/Al, (d) FeOt/MgO vs 10000*Ga/Al, (e) Ce vs 10000*Ga/Al and (f) Y vs 10000*Ga/Al diagrams.

Calculated zircon saturation temperatures for the Besar magma ranging from 793 to 806ºC which is consistent with high temperature partial melting of a felsic infracrustal source. The temperature of the Besar magma was higher compared with the haplogranitic magma (Chappell 1999) which represents a low temperature hydrous silicate melt in equilibrium with quartz and feldspar (Tuttle and Bowen 1958). It is generally accepted that the high temperature of the magma may suggest that the A–type magma originated from partial melting of tonalitic sources which could be one of the candidates for the Besar granite source rock. U Pb zircon age of the A type granite ranging from 280 to 281 Ma which suggested that they are among the oldest granitic rocks in Peninsular Malaysia.

It is generally accepted that the subduction of Paleo-Tethys oceanic floor beneath Indochina terrane started in Early Permian. The subduction will caused an early magmatism along the eastern margin of the Indochina terrane which will resulted in the development of the Sukhotai island arc system. Convection astenosphere driven by the downward drag of the downgoing oceanic slab will caused a spreading and produced the back arc basin behind the magmatic arc (Sukhotai Arc). Regional extension occurs when continental lithosphere breaks in response to long-lived mantle perturbations when hot mantle rises and erodes continental lithosphere, leading to full-scale rifting. These back arc basin now represent by Nan suture and Sra Kaeo suture of central and southern Thailand which can be traced southward to the eastern offshore Malay Peninsular. The extension will cause the hot asthenosphere rises, undergoes decompression melting, and induces melting in the overlying continental crust. Both regional extensional regimes have been proposed as likely tectonic regimes for A-type granites and related rocks.

Warta Geologi (Newsletter of the Geological Society of Malaysia), Vol. 43, No. 3, July-September 2017