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Petrochemistry of felsic rocks from the Oman ophiolite

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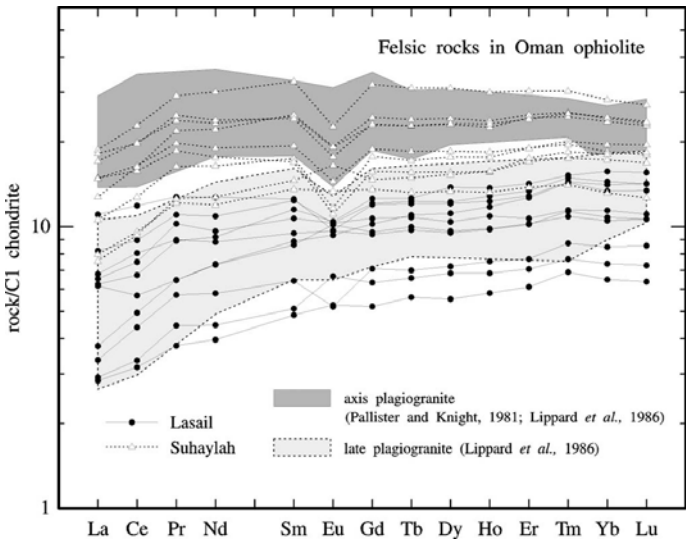

The presence of felsic rocks in ohiolite suites has been reported by numerous authors, and are called plagiogranite (Coleman and Peterman, 1975). Lippard et al. (1986) classified the felsic rocks in the Oman ophiolite into three stages; High-level intrusives, Late intrusives, and younger granites associated with emplacement. The Oman ophiolite contains a particularly well-preserved sequence; exposure is almost contenuous along strike and almost complete vertical sections. Radiometric dating from both the High-level intrusives and Late intrusives show restric range of U-Pb zircon ages around 95Ma (Tilton et al., 1981; Warren et al., 2005). On the other hand, Lippard et al. (1986) reported biotite K-Ar age of 85+/-3 Ma from the biotite aplite intruding the amphibolite sheet and the overlying harzburgite at Sharm in the UAE.

Lasail complex, dimension of 4.7 x 3.8 km, consists of gabbroic and tonalitic rocks. The gabbroic rocks are composed of layered gabbro and massive gabbro. The layered gabbro is intruded by the massive gabbro, and often occurs as large blocks in the massive gabbro. These gabbroic rocks are intruded by small intrusions of hornblende diorite to hornblende tonalite. The tonalitic rocks consists of hornblende diorite to hornblende tonalite, and intrudes into the gabbroic rocks. Suhaylah complex, dimension of 1.5 x 1.5 km, is intruded into cumulate gabbros at a lower contact and into dike complex and basalt at an upper contact. It composed of hornblende quartz diorite including basaltic `pillows' and dismembered dikes, and is intruded by hornblende tonalite at central to eastern part. At the northern pat of the complex, hornblende quartz diorite intrudes into the upper gabbro, and included many blocks of the gabbroic rocks. Small intrusive bodies of biotite granites and tourmaline granites are intruded into harzburgite in the upper part of the mantle sequence at the west of Zaymi, upper stream of the Wadi Fizh. These granites are characterized by leucocratic and fine-grained texture with or without remarkable foliation.

Bulk chemical compositions of the felsic rocks from the Lasail complex are characterized by extreme depletion in incompatible elements; K_2O, P_2O_5, TiO_2, and REEs. In the case of REEs (Figure), felsic rocks from the Suhaylah complex are richer in REE contents than those from the Lasail comples. In addition, tonalitic rocks are characterized by lower concentrations of incompatible elements than dioritic to quartz dioritic rocks, in common to the Suhailah and Lasail complex. This indicates that the tonalitic magma can not produce by the fractional crystallization

from the dioritic to quartz dioritic magma. Koepke et al. (2004; 2007) described that hydrous partial melting of cumulate gabbro is most likely process explaining the petrogenesis of oceanic plagiogranite magma. TiO_2contents of felsic rocks from the Lasail complex, however, shows clearly higher concentrations than that obtained by experimental results after Koepke et al. (2004) .

From the examination of Sr and Nd isotopic signature, igneous rocks in the Oman ophiolite are variously contaminated with seawater as described by McCullogh et al. (1980; 1981). In the case of rocks from the Lasail and Suhaylah complex, they are characterized by rather higher epsilon Sr values than the mantle array. This suggests that the magma has produced by the melting of the rocks with higher epsilon Sr values than those of MORBs, e.g., the axis stage rocks interacted with seawater. On the other hand, the biotite granites intruding into mantle sequence at Wadi Fizh are considered to be produced by partial melting of continental materials during the emplacement stage on the Arabian continental margin.

Keywords: Oman ophiolite, plagiogranite, oceanic crust, petrochemistry