ORE GENESIS OF GRANITE-RELATED Sn-W DEPOSIT IN TAGU AREA, MYEIK REGION, SOUTHERN MYANMAR

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論文題名　：　ORE GENESIS OF GRANITE-RELATED Sn-W DEPOSIT IN TAGU AREA, MYEIK REGION, SOUTHERN MYANMAR (ミャンマー南部，ベイ地方，タグ地域の花崗岩に伴うSn-W鉱床の成因)

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論 文 内 容 の 要 旨

Most granite-related tin-tungsten deposits in Myanmar are located in the Western Granitoid Province (WGP) of Southeast Asia. The majority of tin-tungsten deposits in Myanmar are situated in the Tanintharyi (Tennanserim Division) region, especially in the Dawei (Tavoy Township) and Myeik (Mergui Township) districts except the largest deposit at Mawchi (Kayah State). The mineralization style of the Tagu deposit in the Myeik district is vein type tin-tungsten deposit in both biotite granite and Carboniferous to Lower Permian metasedimentary rocks (Mergui Group). This dissertation describes the characteristics of tin-tungsten mineralization of the Tagu deposit on the basis of field observation, whole-rock geochemistry of granitic rocks, ore mineralogy and fluid inclusion study and discusses the origin of the ore-forming fluid as well as tectonic setting of the granitic magmatism in the Tagu area. This dissertation consists of the following six chapters.

Chapter I delivers location of the research area, history and previous works on the mine, objectives of this dissertation, methodology of research and expected outcome from this study.

Chapter II reviews the geologic background including tectonic evolution of Southeast Asia and Tethys Ocean and granitoid belts of Southeast Asia and Myanmar. Three granite belts of Southeast Asia represent one of the greatest metallogenic province of the world. Their metallogenic endowment is dominated by tin-tungsten, and the province is called as Southeast Asian Tin Belt. The three granite belts of Southeast Asia are Eastern Granite Province, Central Granite Province and Western Granite Province (WGP). The Central Granitoid Belt of Myanmar approximately corresponds to WGP of the Southeast Asian Granitoid Belt.

Chapter III describes the regional geology, deposit geology and nature of tin-tungsten mineralization of the Tagu area. The Mergui Group, which is variably deformed clastic sedimentary strata consisting mainly of pebbly mudstone (diamictite), pebbly sandstone and minor pyroclastic rocks, regionally metamorphosed to phyllites, argillites and quartzites, is widely distributed throughout the Tanintharyi region. The intrusive igneous rocks, very important for the tin-tungsten mineralization, are distributed in this region. Tin-tungsten mineralization was primarily associated with the intrusion of these granitoid rocks. The major mineralization style of the Tagu deposit is represented by cassiterite-wolframite bearing quartz veins that are hosted by the granitic rocks and metasedimentary rocks.

Chapter IV demonstrates the petrography and whole-rock geochemistry of the granitic rocks in Tagu deposit. The biotite granite of the Tagu deposit is composed of quartz, feldspars (plagioclase, orthoclase, and microcline), and micas (muscovite and biotite) and is classified as S-type and peraluminous characterized by the A/CNK [molar Al_2O_3/ ($CaO+Na_2O+K_2O$)] value ranging from 1.17 to 1.41. Enrichment in LILEs (Large Ion Lithophile Elements) such as Rb, K and Pb together with negative anomalies of HFSEs (High Field Strength

Elements) such as Nb, P and Ti indicate that the magma was formed by partial melting of metasedimentary rocks.

Chapter V delivers the ore mineralogy and fluid inclusion studies of the Tagu deposit. In the mineralized veins, early-formed minerals are characterized by oxide ore minerals such as cassiterite and wolframite which were followed by the formation of sulfide minerals such as arsenopyrite, pyrite, chalcopyrite, molybdenite, pyrrhotite, sphalerite, galena and covellite in the later stage. Three main types of fluid inclusions were distinguished from the mineralized quartz veins hosted by granite and metasedimentary rocks: type-A—two phases, liquid + vapor liquid-rich aqueous inclusions; type-B—two phases, vapor + liquid vapor-rich inclusions; and type-C—three phases, aqueous liquid + CO_2-liquid + CO_2-vapor inclusions. The homogenization temperatures of type-A inclusions range from 140 °C to 330 °C (mode at 230 °C), with corresponding salinities from 1.1 wt.% to 8.9 wt.% NaCl equivalent for quartz veins hosted in metasedimentary rocks, and from 230 °C to 370 °C (mode at 280 °C), with corresponding salinities from 2.9 wt.% to 10.6 wt.% NaCl equivalents for quartz veins hosted in granite. The homogenization temperatures of type-B vapor-rich inclusions in quartz veins in granite range from 310 °C to 390 °C (mode at 350 °C), with corresponding salinities from 6.7 wt.% to 12.2 wt.% NaCl equivalent. The homogenization temperatures of type-C three-phase inclusions vary from 270 °C to 405 °C (mode at 330 °C), with corresponding salinities from 1.8 wt.% to 5.6 wt.% NaCl equivalent. The original ascending ore fluid was probably CO_2-bearing fluid which was evolved into two phase fluids by immiscibility due to pressure drop in the mineralization channels. Furthermore, the temperature and salinities of two-phase aqueous fluids were later most likely decreased by the mixing with meteoric water.

Chapter VI discusses the petrogenesis of granitic rocks, tectonic setting of the research area and mechanism of ore formation based on the study of fluid inclusions, and concludes that the granite-related Tagu tin-tungsten deposit was formed at a collision zone.