SEG 2024 Conference: Sustainable Mineral Exploration and Development

Insight from Field and Petrographic Studies of Saltpond and Winneba Pegmatites and Other Associated Rocks: Implications to Ghana's Lithium Occurrence

Theophilus Owusu Agyapong, Mary N. Selby, Samuel Nunoo, Prince O. Amponsah
University of Ghana, Accra, Ghana

The study of pegmatites along the coastal belt of the Kibi-Winneba belt is becoming an emerging geological expedition. This interest is driven by the recent discovery of lithium-bearing spodumene that has commercial value in the green technology. The study is part of an ongoing larger research focused on understanding the mechanisms of fluid migration and interaction of potential Li-bearing pegmatite and tourmaline-rich gabbro. Rock samples collected near/in Saltpond and Winneba provide clues about the geologic history and processes that contributed to the formation of the Li-bearing pegmatites. The Saltpond pegmatites exhibit a distinctive graphic texture, characterized by an intricate intergrowth of quartz and alkali feldspar, and greisen-like muscovite. Additionally, the pegmatite contains acicular to needle-like muscovite laths intergrowth with plagioclase. The specific mechanism behind the formation of this needle-like muscovite is still being investigated, but the kink pattern suggests mineral realignment from postformation deformation. Winneba pegmatite is composed of interlocking and near equigranular grains of muscovite, feldspars, quartz, and spodumene, and dark phases suspected to be Columbite Group minerals. In contrast, the tourmaline-rich gabbro shows ophitic texture, and is composed of crystals of tourmaline, pyroxene, feldspar, and secondary muscovite. While the observed textures suggest the rocks were likely formed from an igneous process, the secondary minerals hints at a later hydrothermal and metasomatic alteration event, a role in concentrating lithium-bearing fluids. Such alteration likely destabilized feldspars, converting them into secondary mica. The schist host rock acted as the potential country rock interacted by fluid from late-stage granitization and magmatism. Graphic texture suggests the presence of water and other volatiles, which lowered the interfacial energy between quartz and feldspar, facilitating their intergrowth. The graphic texture has been recognised as indicator for the potential presence of valuable minerals like lithium, beryllium, or tantalum.