Petrography of Intrusive and Host Rocks in Phayuha Khiri District, Nakhon Sawan Province, Thailand

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ABSTRACT

The petrographic characteristics of intrusive igneous rocks and country rocks in Phayuha Khiri District, Nakhon Sawan Province were investigated with the objective of classifying mineral composition, rock texture, and rock types. The study was conducted through field investigations and thin section analysis under a polarizing microscope on fifteen rock samples. The results indicate that the rocks can be classified into three groups: monzogranite, granodiorite, and green schist. The monzogranite group exhibits coarse- to medium-grained textures and is composed mainly of quartz, plagioclase, and alkali feldspar, with biotite as the principal accessory mineral and minor zircon and opaque minerals.The granodiorite group displays medium- to coarse-grained textures and consists predominantly of plagioclase, alkali feldspar, and quartz, with biotite as the main accessory mineral. Some samples show weak mineral alignment. Secondary minerals such as sericite and chlorite are present, indicating alteration processes.The green schist group is characterized by fine- to medium-grained textures with well-developed foliation defined by the alignment of platy minerals. It is composed mainly of chlorite, quartz, plagioclase, epidote, biotite, and opaque minerals. The texture and mineral assemblage indicate low-grade metamorphism under greenschist facies conditions. This study reflects that the intrusive rocks in the area belong to the granite to granodiorite group, which intruded into the country rocks and caused low-grade metamorphism, resulting in the formation of green schist facies rocks.

Methodology



Field Investigation

- Geological field survey and structural observations.
- Collection of 15 representative rock samples.

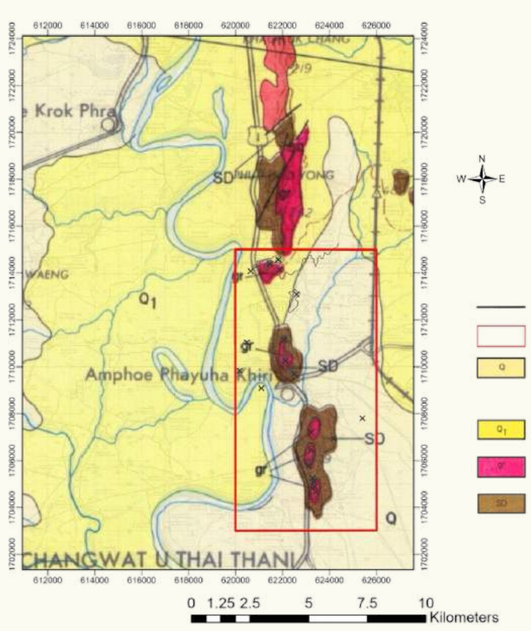


Laboratory Analysis

- **Thin Section Preparation**
  - Preparation of thin sections (0.03 mm thickness)
  - Petrographic examination under Polarizing microscope
- **Modal Analysis**
  - 400-point counting method for modal analysis
  - Rock classification based on QAP nomenclature diagram for felsic to intermediated plutonic rock

Study Area & Geological Setting

- The study area is located in Phayuha Khiri District, Nakhon Sawan Province, Central Thailand.
- Country rock is the Silurian-Devonian sedimentary and low-grade metamorphic rocks of the Ban Rai Group (SD).
- The intrusion is the Permo-Triassic granite, granodiorite, tonalite, and quartz diorite.
- Clear intrusive–country rock relationships are observed in the field.
- These intrusive rocks provide evidence for magma crystallization and the geological evolution of the area.



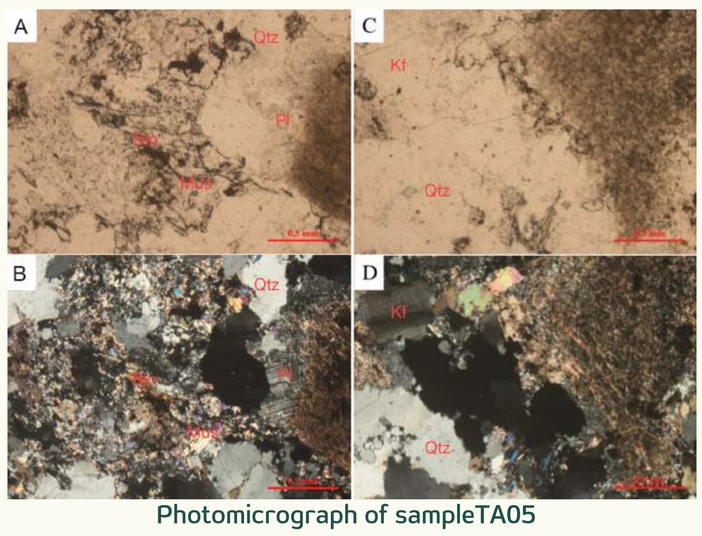
geologic map of study area and photograph of sample locations

Results

15 samples were classified into three main rock groups:

Granite (3 samples: TA05, TA10, TA11)

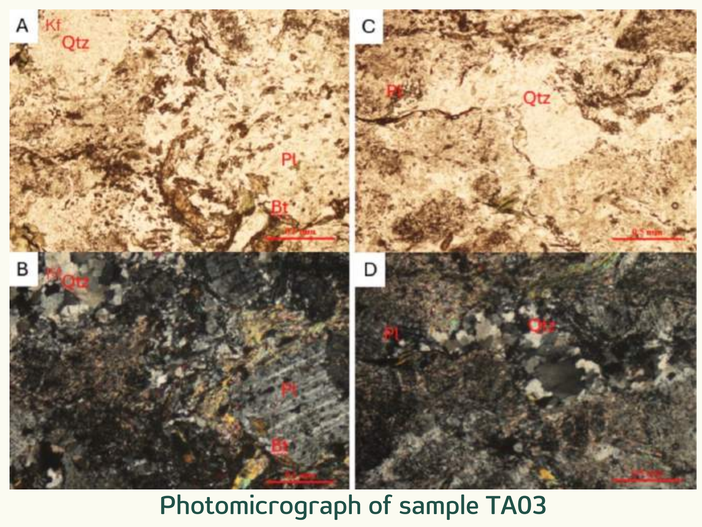
- Coarse-grained texture.
- Main minerals: quartz, K-feldspar, plagioclase, muscovite
- highly alteration with Fe-Ti oxide minerals, sericite



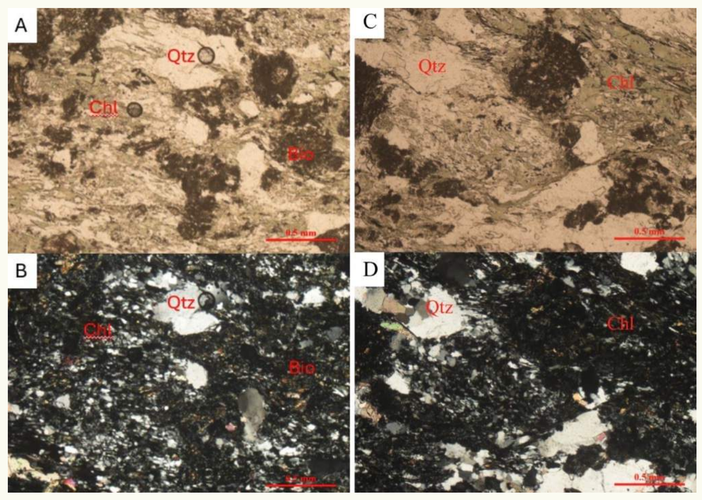
Photomicrograph of sampleTA05

Granodiorite (5 samples: TA01, TA03, TA12, TA14, TA15)

- Coarse-grained texture.
- Main minerals: quartz, plagioclase, K-feldspar, biotite
- Higher plagioclase content compared to K-feldspar



Photomicrograph of sample TA03



Photomicrograph of sample TA06

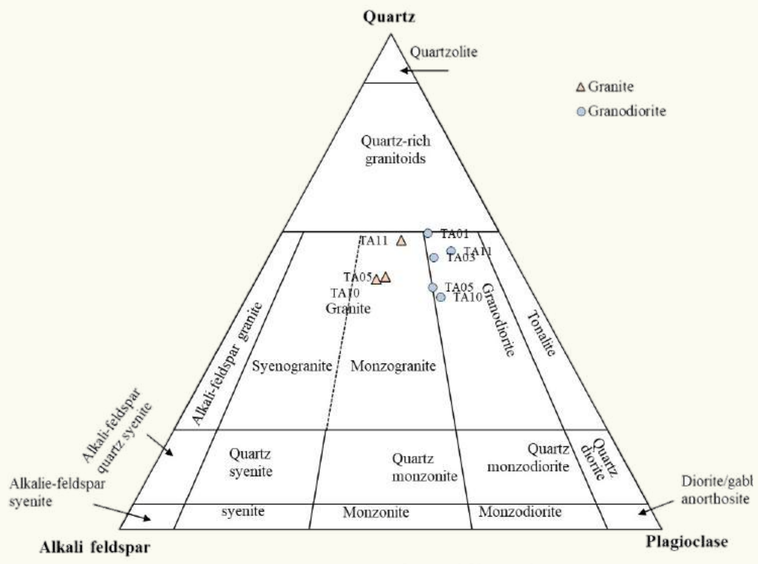
Greenschist (Country Rock)

(7 samples: TA02, TA04, TA06, TA07, TA08, TA09, TA13)

- Low-grade metamorphic rock (greenschist facies)
- Schistose texture with mineral alignment
- Main minerals: quartz, chlorite, plagioclase, epidote

Conclusions

- The intrusive rocks are classified as monzogranite and granodiorite. They show coarse grain texture indicates slow cooling at depth.
- The country rocks belong to the greenschist facies.
- Field and petrographic evidence confirm a clear intrusive–country rock relationship.



QAPF Classification

References

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