Geochemistry and geochronology of porphyry deposits in Edrene range, South west Mongolia

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Copper porphyry deposit is main source of world copper production and they genetically associate with magmatic arc, formed under subduction tectonic setting. During long history of evolution of Euro-Asian super continent in the territory south Mongolia developed Paleo Tethyan ocean in Paleozoic period and then it sequenced by subduction setting and due to this a lot copper, copper-molybdenum and copper-gold porphyry deposits formed. Therefore, Mongolia is one of the most promising country with porphyry type copper deposits in the world.

The Edrene range is one of the island arc terrane located at the south west of Mongolia and it has north east trending structure 250 km long and approximately 60 km wide. The Edrene range occurs between the Tseel and Baaran terranes and contains two distinct sequences. The northern sequence consists of Devonian metamorphosed thin-bedded argillite, sandstone, minor chert, fossiliferous limestone, volcanic rocks and Carboniferous conglomerate, sandstone and limestone intruded by Permian alkaline granite plutons. The southern sequence is dominated by Devonian and Mississippian volcaniclastic rocks, volcanic breccia, tuff, chert, clastic sediments, minor limestone, basalt and andesite. The major-and trace-element chemistry of Devonian basalts suggests an arc origin. The terrane is imbricated by thrust faults, and has experienced intense brittle-ductile deformation and greenschist-grade metamorphism.

Recent exploration activity found several Cu-Mo and Mo-Cu occurrences and deposits as well as several epithermal gold occurrences and wide range of alteration zones. We studied ore mineralogy and geochemistry of mineralization related granitoid bodies from several main porphyry deposits. We did zircon U-Pb dating granitoid rock and mineralization age by Re-Os isochrone method on molybdenite.

Granitoid rock related with porphyry mineralization show calc-alkaline magma characteristics formed under island arc setting. Age of granitoid rock range from 300 Ma to 327 Ma and mineralization age ranges from 298.8 Ma to 333.6 Ma.