Porphyry-skarn copper deposits are the most economically important type of global copper resource and supply about 75% of the world’s copper (Sillitoe, 2010). Widespread porphyry-skarn copper deposits occur in eastern China in a NE–SW trending belt. Previous studies indicate that China’s Mesozoic porphyry-skarn copper deposits formed mainly in two periods: 180–135 Ma and 125–90 Ma (Mao et al., 2011). The large-scale Shilu copper deposit is a typical porphyry-skarn copper deposit located in western Guangdong province, China. The outcrop in the Shilu mine area includes Carboniferous strata and Quaternary sediments. The Shilu granodiorite is closely related to the mineralization and is distributed in the north and center of the mine area. Cu–Mo orebodies are hosted in skarn and adjacent skarnized marble, which are distributed discontinuously around the Shilu granodiorite in the shape of an irregular band. Previous studies were mainly focused on the geochemical characteristics of the Shilu Cu–Mo mineralization (Ma et al., 1985; Li et al., 2000), but little research has been conducted on the geological characteristics of the deposit and its isotope geochemistry (Yu et al., 1988; Sun et al., 2008; Zhang et al., 2008). In addition, there is great controversy over the timing and genesis of the mineralization in this deposit. In this study we present a systematic and precise mineralogical, geochronological LA–ICP–MS zircon U–Pb, and geochemical study of the Shilu intrusion in order to constrain the timing, petrogenesis, and tectonic setting of magmatism in the Shilu Cu–Mo deposit, which in turn enhances our understanding of the dynamics of Mesozoic magmatism in eastern China.

Molybdenites from the Shilu Cu–Mo deposit yield a Re–Os age of 104.1±1.3 Ma, and LA–ICP–MS U–Pb zircon dating of the granodiorites yield the age of 107±0.72 Ma, suggesting that the magmatism was coeval with the timing of mineralization in Late Yanshanian period. The Shilu intrusion are calc-alkaline rocks characterized with enrichment of silica, alkalis, calcium, light REEs, and large ion lithophile elements, and depleted in heavy REEs and high field strength elements. The Shilu intrusion are I type granitoids with both mantle and crustal contributions. Above all, Shilu Cu–Mo deposit was formed in an extensional environment and closely related to the subduction of Pacific plate.

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