Abstract: Lamprophyre is a basic-intermediate rock that usually occurs in veins with euhedral mafic minerals and is generally assumed to be derived by melting of the mantle. The NW to EW trending lamprophyres veins are widely exposed in the mid-eastern Segment II, Jinchuan mineral area. However, very little attention was paid to the lamprophyres. Jia (1986) reported the emplacement age of these lamprophyres to be 1336 Ma using the potassium-argon method, and this age has become an important factor indicating the formation age of the Jichuan deposit is 1500~1600 Ma. However, since Jia did not provide original isotopic data and the potassium-argon method is flawed, hence, we attempt to capitalize on the great significance of lamprophyres in Jinchuan mineral area by performing whole rock geochemistry and situ analyses of zircon U-Pb-Hf isotopes.

Geochemically, the lamprophyres are intermediate rock (SiO₂=52.8%–55.5%) and Calc-alkaline with high values of sodium (K₂O/Na₂O=0.52–1.06) and low values of SI (13.95~24.23). The trace elements of the lamprophyres have high total REE contents (212.58–263.24 ppm), strong enrichment of LREEs (ΣLREE/ΣHREE=12.53–16.08) and LILEs (Rb, Ba, Sr and Ce), relative depletion of HREEs and HFSEs (Nb, Ta, Zr and Hf), and typical “TNT” negative anomaly. According to LA-ICP-MS U-Pb zircon dating of two lamprophyre veins, we distinguished primary zircons from inherited zircons and obtained the age of this lamprophyre igneous activity to be 402.9±6.4 Ma. Hence, the controversy about the formation age of the Jinchuan deposit (1400–1600 Ma or 800–900 Ma) can’t be solved by those dikes. The primary zircons have ¹⁷⁶Hf/¹⁷⁷Hf ratios ranging from 0.282292 to 0.282446 and εHf(t) ranging from -7.98 to -2.9, with τDM age between 1581 Ma and 1909 Ma. The geochemical characteristics indicate that the parental magma of lamprophyres have weak assimilation of crustal materials while rising and are derived from enriched mantle sources which are formed by the subduction of pre-Changcheng formation. We suggest that the generation of the lamprophyres is attributed to decompression melting of enriched mantle sources in an extensional intraplate setting after the North Qilian ocean closure. Inherited zircon ages of the lamprophyres concentrate on
indicating that the research area had multiple phase acid magmatic activities in the Paleoproterozoic, and their Hf isotopes reveal that the formation of the Longshoushan group can be traced back to Neo-archean.

**Key words:** lamprophyres, geochemistry, zircon U-Pb dating, Hf isotope, enriched mantle, Jinchuan mineral area

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**References**


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Fig. 2. Zircon U-Pb age and its concordia diagram of lamprophyres in the Jinchuan mineral area (a-J2-2, b-JZ-27).