

Geochemistry and Mineralogy of Pyroxene in Lamprophyres from Jiaodong Peninsula, China: Evidence for Magma Mixing and Magma Chamber Evolution

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Early Cretaceous lamprophyres are widely distributed as dyke swarms in Jiaodong Peninsula, Eastern China. The lamprophyre dykes, with NE- and NNE-strike orientations, intruded the Mesozoic granitic bodies and Precambrian metamorphic basement. Most of them are accompanied with extensive Early Cretaceous gold mineralization in this region. Here, we combine the compositional data and textural characteristics of pyroxene phenocrysts in lamprophyres to investigate the magmatic evolution of the lamprophyres.

Multiple types of pyroxene phenocrysts can be identified in our lamprophyre samples based on their texture and compositional features, including homogeneous pyroxenes, showing no internal structure, and heterogeneous pyroxenes with zoning or core-rim structure. To comprehend the textural characteristics and geochemical data, we present a magma mixing model for the genesis of these pyroxene phenocrysts in lamprophyres. Pyroxenes with heterogeneous internal structures, included zoning pyroxenes, were formed in magma-mixing process. The homogeneous pyroxenes were formed in certain location of the magma chamber where it was less affected by the magma-mixing and convection process. Occurrence of homogeneous pyroxene megacrysts suggest that there should be a large magma chamber, which could provide an environment with stable physical and chemical conditions for the growth of these megacrysts in a long period. Combining with previous studies, we suppose that there was a large basic magmatic chamber in the depth of Jiaodong area in the Mesozoic Era. And this magmatic chamber may provide heat and material source for the genesis of granite and gold deposits in Jiaodong area.

*This study is supported by the National Natural Science Foundation of China (4152098 and 41673058) and the fund from the Ministry of Science and Technology of People's Republic of China (No. 2016YFC0600105)