Longevity and multistage evolution of subcontinental lithospheric mantle beneath eastern China: evidence from Re-Os isotope geochemistry of mantle peridotite xenoliths from Jiangsu and Anhui Provinces, China

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The Cenozoic alkaline basalts of eastern China contain many mantle peridotite xenoliths. One of the most important locations is the area along the boundary of Anhui and Jiangsu provinces, part of the continental subduction-collision zone between the North China and Yangtze tectonic plates. We present Re-Os results from more than 40 samples collected in Nushan in Anhui province and Pengshishan, Nanliangshan and Fangshan in Jiangsu Province. The samples are mostly anhydrous spinel lherzolites, but also include spinel harzburgites, spinel-garnet lherzolites and modally metasomatized spinel lherzolites including amphibole-, biotite- and apatite-bearing varieties. Except for the Nushan samples, which are more deformed, most samples have protogranular to slightly porphyroclastic textures. Major element compositions vary systematically from fertile to depleted in basaltic components such as Al_2O_3, CaO, TiO_2 and Na_2O. REE patterns vary from LREE enriched to highly LREE depleted, with the modally metasomatized lherzolites displaying highly fractionated REE patterns.

Re and Os abundances vary from 0.018 to 0.375 ppb and from 0.921 to 3.35 ppb respectively. $^{187}Os/^{188}Os$ ratios range from 0.115 to 0.134, in concert with indices of melt extraction such as Al_2O_3, Yb and Lu contents. The Os data indicate a Middle Proterozoic melt depletion age for the lithospheric mantle in the area. This suggests that the shallow spinel lherzolite mantle represented by most of the samples is the remnant of old Proterozoic mantle remaining after delamination. Interestingly, spinel-garnet lherzolites with high equilibration temperatures, found only in Nushan, have both fertile major element compositions and Os isotopic ratios similar to that of the primitive upper mantle. This may indicate that material newly accreted from the asthenosphere has been added beneath the shallow spinel lherzolite, in agreement with tectonic models of the region.

The law of gold activities in alkaline basaltic magma: Evidence from high temperature and ultrahigh pressure experiments

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It is approved by many large and super-large gold deposits that lamprophyres are temporally and spatially related to gold mineralization [1]. There is controversy whether lamprophyric magma provide gold or not in the processes of gold mineralization. The alkaline basaltic magma can be considered as the parent magma of lamprophyres [2]. We carried out the melting experiments of alkaline basalts + gold at high temperature and ultrahigh pressure, and discussed the law of gold activities in alkaline basaltic magma.

The experimental starting materials are alkaline basaltic powder with grain size less than 0.09 mm which were immersed with gold-bearing solutions for 1 h and dried. The content of gold in starting materials is 51 ppb. A DS-29A cubic–type 3600t ultrahigh-pressure apparatus was employed for the experi-ment. The experimental procedure is the same as Huang et al. .

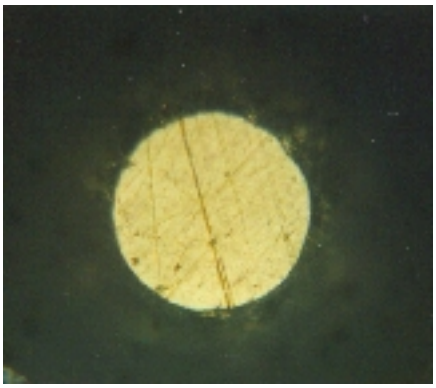

Fig.1 Experimental results of alkaline basalts + gold. 63°¡10, 1.5GPa, 1450°CÊ.

The melting experiments of alkaline basalts + gold at 1.5GPa-3.0GPa and 1400°CÊ-1500°CÊ are carried out and the experimental results show good reproducibility under the same conditions. The experimental results showed that the gold in starting materials assembled to be gold balls and precipitated to the bottom of the experimental products. The boundary lines between the gold ball and the alkaline basaltic glass were distinct (Fig. 1). The alkaline basaltic magma can be considered as the parent magma of lamprophyres [2]. Our Experi-mental results show that the gold in the alkaline basaltic magma in chamber would assemble to be gold balls and precipitate to the bottom of chamber by gravity.

So, the gold contents in ascending lampro-phyric magma whi-ch is product of evolution of alkaline basaltic magma is little. That is to say, the possibility of lamprophyric ma-gma to provide gold in the processes of gold mineralization is little.

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