

Geochronological study on the Bayan Obo REE-Nb-Fe deposit

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The Bayan Obo REE-Nb-Fe deposit is the largest LREE deposit and second largest Nb deposit in the world. The age of the Bayan Obo giant REE-Nb-Fe deposit is controversial as to whether it was formed in the Meso-Proterozoic or Caledonian.

In this study, we determined the U-Th-Pb and Sm-Nd ages of monazite (from disseminated dolomite type ore) and Re-Os age of pyrite (from late stage mineral assemblage) [1]. The combined U-Th-Pb-Sm-Nd dating for 12 monazite grains gives similar Sm-Nd and Th-Pb isochron age of Meso-Proterozoic, indicating that the REE mineralization probably occurred in the Meso-Proterozoic era. This result is significantly different from the Caledonian Th-Pb ages of monazite reported by Wang et al. (1994) [2]. By contrast, pyrite samples dated using Re-Os technique yields a Caledonian isochron age of 439 Ma. These pyrite samples have high Re, low Os concentrations, high Re/Os ratios and highly radiogenic Os. The initial $^{187}\text{Os}/^{188}\text{Os}$ is 1.5, indicating crustal origin [3]. Based on petrological observations and the fact that monazite are significantly older, we propose that this Re-Os isochron age does not represent the mineralization time but records the later disturbance, which was likely induced by the collision between the North China and the Siberian Blocks [4].

The regional geochemical features of the Bayan Obo region are LREE and Th enriched, U depleted, with very low Sm/Nd and low U/Pb values and, low $^{206}\text{Pb}/^{204}\text{Pb}$ ratios, which make it difficult to obtain high resolution Sm-Nd, U-Pb ages. Nonetheless, these dating results support that the REE mineralization in the Bayan Obo deposit took place in the Meso-Proterozoic Era, with disturbance in the Caledonian Era.

References

- [1] Liu Y. L., Chen J. F., Li H. M., Qian H., Xiao G. W., and Zhang T. R. (2005) *Acta Petrol. Sinica* **21**, 881-888.
- [2] Wang J. W., M Tasumoto, Li X. H., Premo W. R., and Chao E. C. T. (1994) *GCA* **58**, 3155-3169.
- [3] Liu Y. L., Yang G., Chen J. F., Du A. D., and Xie Z. (2004) *Chin. Sci. Bull.* **49**, 2627-2631.
- [4] Xu B. and Chen B. (1997) *Sci. China, (Ser. D)* **40**, 463-469.