

# Exsolved phases in apatites from the Qinglongshan eclogite, Jiangsu Province: A preliminary study

J. CHEN<sup>1</sup>, L.S. ZENG<sup>2</sup>, F.Y. CHEN<sup>2</sup>, AND F.H. LIANG<sup>2</sup>

<sup>1</sup> Electron Microscopy Laboratory, School of Physics, Peking University, Beijing 100871, China; jchen@pku.edu.cn

<sup>2</sup> Key Laboratory for Continental Dynamics, MLR, Institute of Geology, Chinese Academy of Geological Sciences, Beijing 100037, China; lzens@ccsd.cn

Recent studies have shown that apatites with needle-like exsolution lamellae are widely found eclogites as well as ultramafic rocks in the Dabie-Sulu UHP metamorphic belt. These studies demonstrated that most of these exsolution lamellae are sulfides (e.g. pyrite and chalcopyrite) with an intriguing mineral chemistry. In this contribution, we focus on composition of solid exsolution lamellae in apatites from a fresh phengite eclogite and a highly retrograded eclogite from the Qinglongshan, Jiangsu Province. Scanning<sup>[1, 2]</sup> Electron microscope (SEM) examinations, electron microprobe and X-ray energy-dispersive (EDS) analyses show that exsolution lamellae in these apatites are dominantly copper-bearing sulfide, possibly  $\text{CuS}_2$ . Experimental studies have shown that  $\text{CuS}_2$  crystal can only be synthesized under high temperature and high pressure conditions ( $T = 700\text{-}1000^\circ\text{C}$ , at  $P = 4.5\text{-}5.0$  GPa). Such a condition is consistent with the UHP metamorphism experienced by the Qinglongshan eclogites. However, the pressure inferred from the presence of  $\text{CuS}_2$  in the Qinglongshan eclogites is substantially higher than that mainly from coexisting garnet-omphacite-phengite pairs, which casts doubts on such an assemblage (e.g. garnet + omphacite) as the true peak UHP metamorphic assemblage as widely held in the UHP community. The preservation of UHP sulfide phases in apatites can be understood by considering the shielding effect of apatite which is extremely stable and chemically inert in the Sulu eclogites. Therefore, apatites may have acted similarly to garnet or omphacite (primary phases that host coesite and diamond) to facilitate the preservation of UHP sulfide phases.

## References

- [1] Liang F.H., Zeng L., Chen J., and Chen F.Y. (2006) *Acta Petrologica Sinica* **22**, 433-438.
- [2] Zhu Y.F., and Massonne H.J. (2005) *Acta Petrologica Sinica* **21**, 405-410.
- [3] This work was supported by Natural Science Foundation of China (No. 40372024).