

## Porphyry Cu (Au) deposit promoted by redox decoupling during magnetite alteration in Yulong

H.Y. LIANG<sup>1\*</sup>, W.D. SUN<sup>1,2</sup>, M.X. LING<sup>1</sup>, X. DING<sup>1</sup>  
AND X. YANG<sup>2</sup>

<sup>1</sup>Guangzhou Institute of Geochemistry, CAS, 510640

(\*correspondence: lianghy@gig.ac.cn)

<sup>2</sup>Univ. of Sci. and Tech. of China, Hefei 230026

Porphyry deposits are one of the most important sources of Cu and Au. It is well known that most of the porphyry copper gold ore deposits are spatially associated with, and genetically related to, oxidized felsic magmas[1]. Many models have been developed to understand this phenomenon. All the previous efforts, however, were focused mainly on the high oxygen fugacity of magmas[2, 3]. Our studies on fluid inclusions from Yulong porphyry copper gold deposits[4, 5] demonstrate that sulphur reduction induced by magnetite crystallization is essential in the final precipitation of Cu (Au) bearing sulphides. The Yulong porphyry Cu (Au) deposit located within the eastern margin of the Tibetan plateau is one of the largest porphyry Cu (Au) deposit in China, containing a total of over 6 million tons of Cu metal. Similar to other porphyry Cu deposits in the world, the Yulong porphyry is highly oxidized. Sulfate is the dominant sulfur species in fluid inclusions hosted by magmatic quartz phenocrysts, indicating an oxygen fugacity above the SSO buffer during magmatic processes. The dominant sulfur species changed from sulfate dominant during magmatic processes to sulfide dominant during the main mineralization processes, corresponding to a dramatic decrease in oxygen fugacity. Remarkably, magnetite crystallization is coincident with the onset of major sulfur reduction. Redox decoupling and fluctuation are the key and direct indications of ore formation. High oxygen fugacity is favorable for mineralisation because it enables redox fluctuation. Redox fluctuation can be well preserved in zircon, a resistant accessory mineral popularly found in porphyries, and a handy and reliable exploration tool [4, 6].

[1] Sillitoe (1997) *Aust. J. Earth Sci.* **44**, 373-388. [2] Mungall (2002) *Geology* **30**, 915-918. [3] W.D. Sun *et al.* (2004) *Nature* **431**, 975-978. [4] H.Y. Liang *et al.* (2006) *Mine. Depos.* **41**, 152-159. [5] H.Y. Liang *et al.* (2008) *Acta Petrol. Sin.* **24**, 2352-2358. [6] Ballard *et al.*(2002) *CMP* **144**, 347-364.

## Characterisation of particulate matter captured in diesel particulate filters

A. LIATI AND P. DIMOPOULOS-EGGENSCHWILLER

EMPA, Swiss Federal Laboratories for Materials Testing and Research, Ueberlandstr. 129, Dübendorf, Switzerland  
(anthi.liati@empa.ch)

Particulate matter (PM) produced by diesel engines constitutes a major component among atmospheric pollutants. PM in the atmosphere has been significantly reduced since the introduction of diesel particulate filters (DPF), which reach a capture capacity of up to 95%. PM in the exhaust gas of diesel engines consists mainly of carbonaceous soot, adsorbed hydrocarbons and reaction products of lubricant components. Part of the PM accumulated in the DPF is periodically removed by oxidation to CO<sub>2</sub>, whereas non-burning PM components form a deposit layer in the DPF characterised as ash.

Soot and ash accumulation layers were examined here by means of optical microscopy, SEM and XRPD in a repeatedly regenerated DPF of a small truck using diesel fuel without additives. Soot occurs as aggregates forming a coherent 'soot cake' deposited on the porous walls of the DPF channels. Distribution of soot deposits in form of overlying layers slightly varies along the filter inlet channels having a total thickness of ca. 100-130 µm in the first ca. 10-15 cm from the filter inlet and reaching ca. 200-250 µm at the rear parts. Outlet channels are completely devoid of any deposited material. XRPD-patterns of soot revealed no graphite peak implying that carbon is generally amorphous. However, a shoulder-like rise at the graphite position observed in some XRPD-diagrams can be interpreted to reflect some degree of ordering of the carbon atoms.

Ash occurs in form of generally brittle incoherent very fine particles. It is distributed all over the DPF and forms a layer directly on the filter wall, over which new soot is deposited. Ash is highly concentrated at the plugged ends at the rear part of the filter, where it blocks the last ca. 2.5 to 6 cm of the totally 30 cm long inlet channels. It shows a tendency to accumulate at the central over the periphery channels, which is in line with the flow pattern of the exhaust gas being faster in the central parts (higher PM supply) of the filter relative to the periphery. Based on qualitative EDX analyses with SEM, the chemical composition of the ash includes mainly S, Zn, P, Mg, Si, Na, Fe, Ca, Al and O. Besides very fine-grained PM components, relatively coarse-grained (up to 2 mm) white mica and possibly cordierite were found as minor constituents of the ash.