Mineralogy and geochemistry of Cenozoic potassic volcanism in the Hoh Xil area, northern Tibetan Plateau: Implications for mantle source characteristics and petrogenesis

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Miocene potassic volcanic rocks (7.77~17.82Ma) in the Hoh Xil area of northern Tibetan Plateau are mainly composed of three groups: trachyandesite, trachyte and rhyolite. They display porphyritic textures, with abundant phenocrysts embedded in a fine groundmass. Augite, hypersthene, andesine and oligoclase are ubiquitous phenocrysts in the mafic lavas, whereas the more silicic lavas contain quartz and biotite. These potassic rocks are strongly enriched in LILE and LREE, and clearly depleted in Nb-Ta-Ti elements. They have high $^{87}Sr/^{86}Sr$ (0.707346~0.714915), low ε_{Nd} (-3.70~-6.97), and high radiogenic Pb isotope ratios ($^{207}Pb/^{204}Pb$ =15.65~15.76, $^{208}Pb/^{204}Pb$ =38.98~39.35, $^{206}Pb/^{204}Pb$ =18.67~18.78).

Clinopyroxene-liquid thermobarmeters following Putirka *et al*. [1] models shows range of equilibrium temperatures and pressures are 1065°C~1100°C and 5.3~9.1kbar, respectively, which suggests Cenozoic intermediate-acidic volcanic rocks in North Tibet evolved from the upper-middle crust (<30km).

Geochemical and isotopic data indicate that source of the magmas is an enriched mantle which possibly resulted from earlier episodes of oceanic slab subduction. The source region metasomatized is inferred to lie within the lithospheric mantle and places constraints on geodynamic setting of the plateau evolution. Mineralogical and geochemical characteristics of the potassic magmatism in North Tibet are dominantly controlled by partial melting, source region composition and crustal assimilation and fractional crystallization (AFC).

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[1] Putirka *et al*. (2003) *American Mineralogist* **88**, 1342-1554.

Atmospheric nanoparticle: Multi-scale analysis on speciation of toxic metals in urban and indoor dust

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Adverse health effects caused by ultra-fine partcticles (<100 nm) have been studied extensively in epidemiologly for a decade. However, it is still under debate whether the size or their crystallochemistry is a major factor to govern the toxicity, partly because there is limited knowledge regarding the speciation of the elements, particularly toxic metals, which often occur as nanoparticles. This study demonstrates systematic multi-scale (bulk to nano) analysis on the speciation of Pb, Mn, Cr and the other toxic metals in two NIST standard reference materials; urban dust (SRM1649a) and indoor dust (SRM2584).

The major phases were characterized by powder X-ray diffraction (XRD) analysis and scanning electron microscopy (SEM) in bulk and micron scale. The speciation of Pb, Mn and Cr were determined by X-ray absorption near-edge structure (XANES) spectra at the Saga Synchrotron Light Source, Japan. Nano-scale analysis was performed using a (scanning) transmission electron microscopy ((S)TEM) with high angle annular dark-field (HAADF) detector .

XRD and SEM reveal that major phases are quartz, gypsum, kaolinite, and muscovite in the urban dust, while qurtz, gypsum, calcite, muscovite and possible chabazite in the indoor dust. Iron-oxides, Th-particle, Ti-oxide and Pb-phases are present in both sample as a minor phase. The speciation of the three toxic metals determined by XANES are $PbSO_4$, $MnSO_4$ and chromite ($FeCr_2O_4$) in the urban dust, while PbS, $MnCO_3$ and Cr_2O_3, and chromite in the indoor dust. A number of nano-sized Pb-particles and some spherical Fe-particles are found in the urban dust. The spherical shape indicates that they originate from combustion. In the indoor dust, a few Pb-particles in relatively large size are present, which likely originated from interior decoration materials.

Our multi-scale analysis has revealed that most toxic heavy metals are associated with nanometer-sized atmospheric particulates in both SRMs, suggesting that these elements can potentially penetrate into the deeper part of respiratory system. Still, estimation of their bioavailability may be more complicated than those based on the bulk thermodynamic property.