Os-Ir-Ru alloys and Ru-Os sulfides from clinopyroxenite-dunite complexes: A combined EMPA, LA MC-ICP-MS and N-TIMS study

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The Kondyor, Inagli, Bor-Uryah and Guli clinopyroxenite-dunite complexes, located in the limits of the Siberian Craton, are associated with platinum-group elements (PGE) placer deposits. The compositionally diverse platinum-group minerals (PGM) from these placer deposits have been studied by a number of modern techniques including SEM, EMPA, LA MC-ICP-MS and N-TIMS.

Detrital Pt-Fe alloy grains constitute the majority of PGM at Kondyor and Inagli, whereas Os-rich alloys [i.e., osmium Os, iridian osmium (Os,Ir)], osmian iridium (Ir,Os) and Ru-Os sulfides are subordinate species. In contrast, Os-rich alloy grains predominate at Guli, whereas the detrital PGM assemblage at Bor-Uryah contains equal amounts of Pt-Fe and Os-Ir alloy grains.

Since the concentration of Re in all PGM grains is less than 0.05 wt.%, the isotopic effect resulting from the radioactive decay of ^{187}Re can be considered negligible. Consequently, the value of ^{187}Os/^{188}Os in the detrital PGM corresponds to that in the source area at the time of PGM formation. The ^{187}Os/^{188}Os value measured by LA MC-ICP-MS and N-TIMS in osmium (80-100 wt. % Os) varies from 0.12326 ± 0.00001 to 0.12529 ± 0.00001. The ^{187}Os/^{188}Os value in PGMs with Os contents between 50 and 79 wt.% (i.e., PGE alloys of the system Os-Ir-Ru and Os-Ru-Ir-Pt) ranges from 0.12309 ± 0.00002 to 0.12775 ± 0.00001. The ^{187}Os/^{188}Os values in PGM, which contain Os in the range 1-31 wt. % (i.e., laurite, rutheniridosmine and erlichmanite) show a less pronounced variation, from 0.12333 ± 0.00015 to 0.12462 ± 0.00009.

In contrast to PGM from ophiolites, the main set of PGM in this study (n=96) closely matches the present-day ^{187}Os/^{188}Os values for depleted mid-ocean ridge mantle (DMM; 0.1246 ± 0.0014, [1]).

References

[1] Snow J.E. and Reisberg L. (1995) *Earth. Planet. Sci. Lett.* 136, 723-733.

He, Ar, S, O and H isotopic data and their implications for the gnesis of the Daduhe gold deposits along the eastern margin of the Tibetan Plateau, northwest china

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The Daduhe gold district is located in the eastern part of the Indo-Eurasian collision belt eastern margin of the Tibetan Plateau. The region is characterized by large faults and strike-slip systems related to escape tectonics during the Indo-Eurasia collision. A lot of gold deposits and occurrences were developed along both Jinshajiang-Ailaoshan strike-slip fault and the western margin of the Yangtze Craton, the latter is mainly includes the Daduhe, Shimian and Jinpingshan gold districts.

The Daduhe gold district comprises several shear-zone-controlled Tertiary lode gold deposits. The deposits are hosted in a Precambrian granite-greenstone terrane within the Yangtze Craton. The gold mineralization occurs mainly as auriferous quartz veins with minor sulfide minerals. Fluid inclusions in pyrite have ^{3}He/^{4}He ratios of 0.16 to 0.86 Ra, whereas their ^{40}Ar/^{36}Ar ratios range from 298 to 3288. The He and Ar isotope data indicate mixing of fluids of mantle and crustal source. The δ^{34}S values of pyrite are 2.5 ±1.0 ‰ (n=12), suggesting it either introduced directly from the mantle or by leaching from mafic country rocks. Hydrothermal quartz has δ^{18}O values (with estimated temperature ranging from 220 to 250ºC) between 7.9 and 14.7 ‰ and δD values between -39 and -108 ‰, indicating mixing of magmatic and meteoric fluids. The noble gas isotopic data, along with the stable isotopic data suggest that the ore-forming fluids have a dominantly crustal source with a significant mantle component. The volatiles in the ore-forming fluids are associated with the degassing of mantle along deep faults during the covergent tectonic environment.

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