

Chromite-rich cumulates in mafic xenoliths, São Vicente, Cape Verde Islands

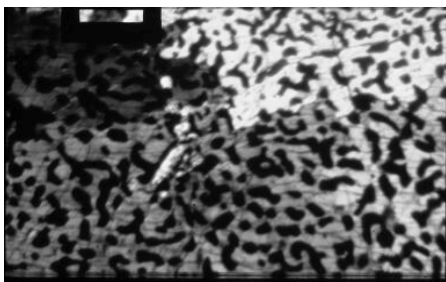
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Mafic xenoliths from two basanitic lavas at São Vicente have mineral compositions and textures indicating that they could be early cumulates, fractionated from magmas similar to the host of the xenoliths. In one of these lavas some xenoliths accumulated up to 25% anhedral chromite in poikilitic olivine (mg# 83-86) and ferri-titan-chromdiopside

The shape of the chromite grains as well as their high concentration has not been reported from other xenoliths from the Cape Verde Islands. We have puzzled our brains over their origin.



The chromites have cr# and fe^{2+} # ~ 40-60 and are relatively rich in Ti and Fe^{3+} . Such composition is known from chromite in kimberlites and is thought to be a result of fluid release from the magma during decompression. The anhedral shape could form either

1. By early precipitation and later partly dissolution of chromite in the magma. Complete dissolution of chromite was avoided by the high concentration of chromite buffering the melt, or 2. Matveev and Balhaus reports an experiment on an olivine and chromite saturated basaltic melt which holds sufficient H_2O (> 4 % H_2O) to release fluid when decompressed. Chromite then precipitated as pearls inside the fluid bubbles. They rose towards the top of the magma chamber until the bubbles got overloaded with chromite and sunk. This could be the explanation for the shape and concentration of the São Vicente xenoliths although the chromite concentration maybe never passed the critical mass limit but kept flowing. Based on the primitive nature of olivine and clinopyroxene and because the necessary water may have been present we prefer the second solution.

References

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 Roeder P.L. and Reynolds I. (1991). *Journal of Petrology* **32**, 5, 909-934.

Comparison of laser ablation and micromill sampling techniques for MC-ICPMS ^{230}Th - ^{234}U - ^{238}U measurements on speleothems

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In situ laser ablation (LA) MC-ICPMS can be used to achieve U-series isotope measurements at very high spatial resolution without prior chemical separation procedures. However, matrix effects especially for mass and elemental fractionation pose significant problems for accurate determinations of ^{230}Th - ^{234}U - ^{238}U ratios.

Procedures for accurate determinations of U-series isotope ratios using *in situ* laser ablation (LA) and MicroMill techniques for carbonates such as speleothems are presented. For LA analyses we are using a New Wave UP193HE laser and a new multiple ion counting detector system available for the ThermoFinnigan Neptune MC-ICPMS. Multiple ion counting increases the efficiency of low level ion beam collection by allowing simultaneous collection of all ion beams and also circumvents problems associated with unstable, transient beams. We present details of our measurement setup for LA measurements and the correction procedures for instrumental fractionation effects using a matrix matching carbonate standard.

We compare results of LA U-series measurements on a U rich (40 - 90 $\mu g/g$) speleothem from Spannagel Cave (Austrian Alps) to results on samples from the same speleothem section prepared using a New Wave MicroMill and processed through separation and purification solution chemistry. For laser ablation results, we currently obtain precisions of $^{230}Th/^{238}U$ in the range of 3 % (2σ), the solution analyses yield more precise $^{230}Th/^{238}U$ isotope ratios in the range of 1 %. Accuracy is assessed by comparison to conventional MC-ICPMS and TIMS measurements.

Key advantages of our LA technique are, for example, a matrix matching calibration standard, high spatial resolution analyses and the possibility of rapid determination of numerous coeval subsamples. We also demonstrate that LA measurements yield accurate but less precise results on speleothem samples with less than 1 $\mu g/g$ U. The results on MicroMill samples are more precise but this sample preparation technique is time consuming and for a single measurement a bigger sample size is needed. For solution U-series MC-ICPMS measurements a minimum total load of about 5 ng for ^{238}U and about 10 fg for ^{230}Th should be used.