Oxide surfaces: Geometric and electronic structure

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Single crystalline oxide surfaces have been prepared by physical vapour deposition on suited metal single crystals. The geometric structures of surfaces have been characterized by a number of techniques, including STM and NC-AFM as well as LEED, and LEEM. The electronic structure has been studied using photoelectron spectroscopy NEXAFS as well as EPR, and augmented by FTIR. In this talk a number of specific examples including iron oxides, ceria, vanadia, and MgO are discussed. The study of water on those surfaces has been investigated.

Felsic magma generation in the oceanic crust: A geochemical study of Pacific Antarctic Rise lavas

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Glassy lavas from the Pacific Antarctic Rise show variable SiO_2 contents between 49 and 68 wt.% and range from basalts to dacites. The trace element compositions range from depleted to slightly enriched mid-ocean ridge basalts whereas the evolved lavas are more enriched in most incompatible elements but show negative anomalies of Ba, Nb Sr, Ti and positive anomalies of Rb, U, Zr and Hf compared with the basalts. In terms of major elements the lavas lie on typical tholeiitic fractionation trends. The evolved lavas show the same trends as the basalts in Nd and Pb isotope space while there is a deviation towards higher Sr isotope ratios at a given Nd isotope ratio. The evolved glasses tend toward anomalously low $\delta^{18}O$ values and show increasing Cl content with increasing SiO_2. These isotopic and chemical variations likely reflect assimilation of hydrothermally altered crustal rocks. Because light $\delta^{18}O$ values occur only in the lower part of the oceanic crust (> 1 km bsf) the assimilation and fractional crystallization processes probably occurred at the lower boundary of the sheeted dikes. Crustal partial melting yielding dacite magma and mixing of these melts with basalts can be ruled out based on trace element ratios and major element distributions. The petrogenesis of the evolved magmas has been modeled quantitatively using MELTS [1] and EC-RAFC [2]. We conclude that AFC processes lead to the formation of evolved magmas beneath the PAR with trace element similarities to the continental crust.

[1] Ghiorso, S. & Sack, R.O. (1995), *Contrib Mineral Petrol,* (1995) **119**:197-212. [2] Bohrson, W.A. & Spera, F.J. (2007), *Geochemistry Geophysics Geosystems,* Vol. **8**, Technical Brief.