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Book of Abstracts

High spatial resolution mapping of H₂O concentration in glass

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Keywords: FTIR spectroscopy, H₂O mapping, high spatial resolution

Several spectroscopic techniques are available to quantify H₂O concentrations in silicate glasses. However, a very high spatial resolution on a μm -scale is necessary to quantify small scale degassing or hydration processes such as H₂O resorption from vesicles into melt during cooling that causes μm -scaled H₂O concentration gradients in quenched glasses around vesicles (McIntosh et al. 2014).

Lowenstern & Pitcher (2013) calibrated total and molecular H₂O concentration in glasses with mid-infrared attenuated total reflection (ATR) FTIR spectroscopy providing a spatial resolution of $\sim 8 \mu\text{m}$. We present the novel usage and the calibration of ATR FTIR spectroscopy coupled to a 64x64 pixels focal plane array detector (FPA) to quantify and map H₂O concentrations in experimentally degassed and vesiculated melts that were quenched to glass with high spatial resolution on a μm -scale (min. possible pixel size $\sim 0.5 \mu\text{m}$). The results document the ability of the ATR-FPA method to quantify μm -sized H₂O gradients in glass surrounding vesicles (Fig. 1, Allabar & Nowak, 2020).

Schanofski et al., (2019) calibrated ATR FTIR spectroscopy for CO₂ concentrations in silicate glass. Thus, future studies can apply the high resolution ATR-FPA method for CO₂ concentration mapping. In addition, we suggest the ATR-FPA method as a useful tool for the spatially resolved analysis of H₂O and CO₂ in melt inclusions, partly crystallized glasses, or strongly vesiculated samples. The adaptation of spectrometer equipment or the usage of a synchrotron MIR light source may improve the ATR-FPA method for future applications.

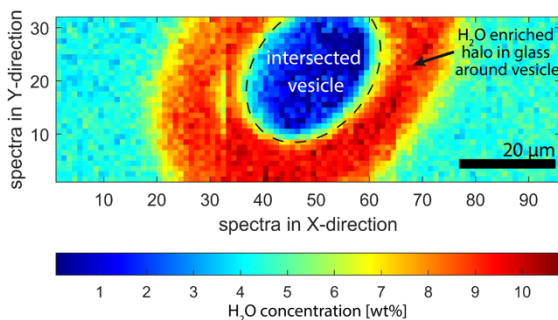


Figure 1 Total H₂O concentration map of an experimentally degassed peralkaline rhyolitic melt quenched to glass and analyzed with the ATR-FPA method (3 FPA frames). H₂O resorption during cooling cause H₂O concentration gradients around the intersected vesicle.

Allabar, A. and Nowak, B. (2020): High spatial resolution analysis of H₂O in silicate glass using attenuated total reflection FTIR spectroscopy coupled with a focal plane array detector, *Chem. Geol.*, 556.

Lowenstern, J.B. and Pitcher, B.W. (2013): Analysis of H₂O in silicate glass using attenuated total reflectance (ATR) micro-FTIR spectroscopy. *Am. Min.* 98, 1660-1668.

Schanofski, M., Fanara, S. and Schmidt, B. (2019): CO₂-H₂O solubility in K-rich phonolitic and leucititic melts. *Contrib. Mineral. Petrol.* 174, 52.

McIntosh et al. (2014): Distribution of dissolved water in magmatic glass records growth and resorption of bubbles. *EPSL* 401, 1-11.

Shine On You Crazy Scheelite: Unraveling micro-textures of scheelite from the Eastern Alps

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Keywords: ore deposits, tungsten mineralization, Eastern Alps

Scheelite (CaWO₄) is the principle carrier of tungsten in the Eastern Alps occurring in different mineralization styles (strata-bound, skarn-type, orogenic Au-(W), etc.). Studies involving fluorescence and cathodoluminescence (CL) have proven to be very useful revealing complex micro-textures and zoning in scheelite, which can be used for discriminating between scheelite from different environments (Poulin et al., 2016).

This study compares scheelite from the economic W mine in Felbertal (Salzburg) with those from many smaller sub-economic W occurrences all over the Eastern Alps; i.e. from a broad spectrum of different mineralization styles. This study is part of the "W Alps" project which re-investigates the tungsten potential in the Eastern Alps using a combined analytical approach (CL, trace elements).

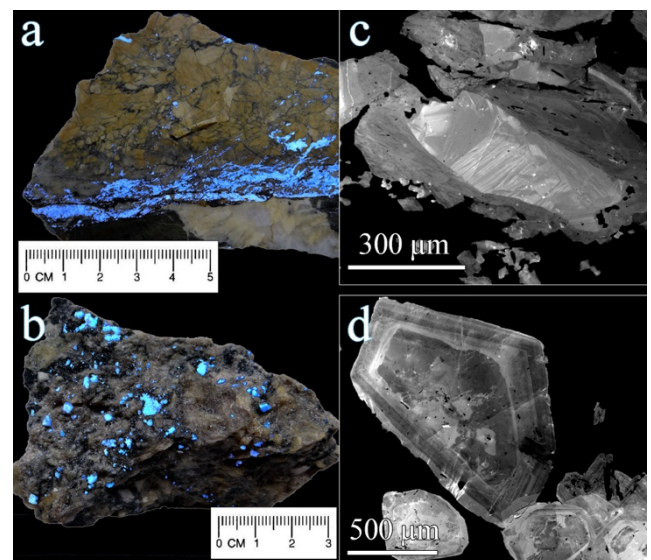


Figure 1 UV-fluorescent scheelite in (a) ferroan dolomite, Tux-Lanersbach and (b) sericitic/chloritic host rock, Lienzer Schlossberg. CL images of scheelite: (c) cataclastic scheelite, Tux-Lanersbach; (d) primary growth zoning in euhedral scheelite, Lienzer Schlossberg

CL studies show that scheelites from magmatic-hydrothermal settings (e.g. Felbertal, Lienz) may preserve a distinct primary zonation, whereas "metamorphic" scheelites lacking any obvious relation to granitoids (e.g. Tux) show rather homogeneous internal micro-textures (Figure 1). In the latter, deformation and metamorphic overprint resulted in specific cataclastic and recrystallisation textures as well as localized remobilization leading to formation of several generations of scheelite.

Poulin, R. S., et al. 2016, *Can Mineralogist*, 54, 1147-1173.