Quantification of water content in silicate melt inclusions via Raman Spectroscopy

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In silicate magmas, key physiological properties such as liquidus and solidus temperatures, viscosity, and phase assemblages during crystallization will be heavily influenced by melt water content. Additionally, water released from magmas during their crystallization and cooling is an important mechanism for metal transport during the formation of metallic ore deposits. The purpose of this study is to develop a method to analyze the water content of silicate melt inclusions via laser Raman spectroscopy. Raman analysis is useful in that it provides high spatial resolution, is non-destructive to the sample, and can be performed on unexposed melt inclusions without advanced sample preparation or mounting techniques. Melt inclusions with known concentrations of water are being used to generate a calibration of the Raman spectrometer at Saint Mary's University. Preliminary method development has been successful and work in progress is resolving key interferences with water signals including secondary fluorescence generated from coloured melts. This method will be applied to the analysis of felsic melt inclusions in ancient volcanic rocks from a variety of ore deposit settings in British Columbia and New Brunswick in order to track the degassing and crystallization history of ore forming magmas, and hopefully predict the most productive (i.e., metal-fertile) magmatic events.