

## **Microanalysis of Minerals, Fluid and Melt Inclusions by Excimer Laser-Ablation ICP Mass Spectrometry**

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LA-ICP-MS has become the preferred analytical technique for a wide range of geochemical and petrologic investigations, where the concentration of a large number of elements of extremely variable concentrations (0.01 ppm to 100%) need to be analysed simultaneously at high spatial resolution (10-100 micron). Excimer lasers and advanced UV optics have widened the range of accessible materials, now permitting controlled ablation and fractionation-free, non-matrix-matched quantification of practically all minerals and silicate glasses, as well as lithium tetraborate, metals and even organic plastics. Recent developments using Time-Of-Flight mass-spectrometry have promising potential for further reduction of sample volumes and for higher precision in isotope-ratio determination of small samples. Geologic applications have focussed on micro-inclusions of fluids, minerals and silicate melts in natural and synthetic minerals. We discovered extreme degrees of trace-element partitioning between chloride brines and coexisting lower-density vapour fluids, and first analyses of gold in single fluid inclusions indicate a strong fluid-source control on the bulk composition of magmatic-hydrothermal ore deposits. Other applications include rare-earth-element distribution among fluids and carbonate minerals, U/Pb dating of zircons, experimental determinations of element distribution coefficients between granitic melts and aqueous fluids, and the estimation of thermodynamic properties of minerals from natural fluid/mineral equilibria.