Recent Advances in the Analysis of Fluid Inclusions by Laser Raman Microspectrometry

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Many instrumental methods are being used to obtain information on the composition of single fluid inclusions, but for many kinds of fluid inclusions the coupling of micro-thermometry and laser Raman microspectrometry is still the only viable option.

Raman microspectrometers of the newest generation (*e.g.*, the LabRam of the Dilor component of the Instruments S.A. conglomerate, or the Systems 2000/3000 of Renishaw) are equipped with holographic notch filters for Rayleigh-line blocking, confocal configuration, thermoelectrically cooled CCD detector, air-cooled laser, and software to recognise cosmic rays interfering with the spectrum of the fluid inclusion. The use of notch filters leads to a high throughput and allows the detection of even very weak signals, and the confocal microscope optics allow to perform spatial- and depth-resolved measurements with a resolution on the micrometer scale and often strongly decreases fluorescence. With such instruments the detection of the Raman signal from fluid-inclusion components has been improved by at least one order of magnitude, resulting in a high sensitivity at very fast analytical conditions.

Recent advances in the Raman microspectrometry of fluid inclusions include the long-awaited solution of the conflicting microthermometric and Raman analyses in CO_2 fluid inclusions reported by many authors from mantle xenoliths, the application of the method to several properties of aqueous inclusions such as chlorinity and the determination of cations in sulphate-bearing solutions. Attempts have been made to obtain in-situ quantification of $\delta^{13}C$ in carbonic inclusions.