# Synchrotron FTIR on melt inclusions, clinopyroxene and olivine from Mt Etna recent explosive eruptions

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The volatile budget of magmas from active volcanoes are crucial in developing volcanological models. The solubility of $H_2O$ in silicate melts is, on the whole low, and strongly dependent on pressure. As a consequence magmatic melts reaching the surface have lost most of their original volatile contents.

We studied the volatile content of recent eruptions of Mount Etna (the 3930 BP picritic eruption and Cono del piano - 2001 and 2002 eruptions), to reconstruct a model for the ascent and degassing of these magmas. We determined the volatiles content by FTIR techniques measuring the hydrogen content of clinopyroxene phenocrysts and the $H_2O$ and $CO_2$ contents of melt inclusions entrapped in the same clinopyroxenes (cpx) as well as in olivine (ol) phenocrysts.

Synchrotron FTIR experiments were conducted at SMIS (Soleil, Paris) and SISSI (Elettra, Trieste) beamlines. FTIR spectra were collected in the 900-8000 $cm^{-1}$ range with 4 $cm^{-1}$ resolution using scanning areas of variable size (200-400 μm-long and 200-400 μm-wide) following a regular grid of square-aperture dimension of 10 μm. Thus we measured high resolution chemical maps of $H_2O$ and $CO_2$ distribution and speciation on melt inclusions to study the diffusion of H between the inclusions and cpx- or ol-host mineral. Line transect across chemical zonations in cpx (from the outer edge to the core of the crystal) showed details on the $H_2O$ distribution with a more water rich core (PDL2001: 214 ppm $H_2O$; TEF2002-2:204 ppm $H_2O$ ) and a more "dry" (PDL2001: 138 ppm $H_2O$; TEF2002-2: 109 ppm $H_2O$) rim as detected by polarised FTIR spectra of oriented single-crystals. The water content of the Etna cpx phenocrysts is quite high suggesting a water rich magmatic system and showed only minor variations from the different eruptions: 254 ppm $H_2O$ for 3930 BP picritic eruption; 214 ppm $H_2O$ for 2001 eruption; 161-254 ppm $H_2O$ for 2002 eruption.

# Amber and amber-like materials on the Romanian market

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Amber is a natural fossil resin with a controversial paleobotanical origin and is a mineraloid for mineralogists. The final internal structure and chemical composition of amber depend on light and oxygen exposure, on temperature and humidity differences, also on the biologic agents that characterized the environment, including the geological one, after resinosis (a large, unrepeatable secretion of resin by some Conifers and flowering trees, during Cretaceous and Tertiary periods). The oxidizing processes into the depositional context are important for the gemological properties of amber (color, cracks and transparency).

There are few amber varities used for manufacturing, including jewelry: the Baltic amber with its variety succinite (Poland, Russia, Baltic Countries, Ukraine, Germany), the amber of Dominican Republic, the Chinese amber, the Burma amber (burmite), the amber from the Romanian Carpathians (rumanite or romanite). In Romania amber is treated as gemstone, including the risk of fake industry, that uses both natural substances (e.g., actual resins, copal and pressed amber), and synthetic polymers (glass and plastics). A distinction between amber and imitations could be made applying Fourier-transform infrared spectroscopy (FTIR) and X-ray diffractometry (XRD) targeting the natural inclusions or proving an internal organizing tendency of material. FTIR curves of amber-like samples found ourdays in gem exhibitions organized by the Geological Institute of Romania are similar to those of romanite samples are similar to those of romanite, succinite, Dominican amber, burmite and copal. On the contrary, plastics, synthetic resins and modern resin of Rosaceous are found on the Romanian market, used as imitations or sometimes sold as genuine amber.

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