IN MEMORIAM

Olivier Jaoul (1944–2005)

We are saddened to report that Olivier Jaoul of the Université Paul Sabatier in Toulouse, France, died on November 15. Born in Neulîy sur Seine in 1944 and trained as a physicist in the laboratory of Jacques Friedel, Jaoul was recruited into geophysics by Claude Froidevaux at the Laboratoire de Géophysique et Géodynamique Interne at the Université Paris Sud in Orsay. In 1997, he moved his laboratory to Toulouse and joined the Laboratoire d’Étude des Mécanismes et Transferts en Géologie. In both Orsay and Toulouse, Jaoul’s laboratory pioneered new experimental techniques to study plastic deformation and atomic diffusion in mantle minerals; this research was always characterized by care in the design and execution of the experiments. The acquisition of new data for atomic diffusion led Jaoul and his colleagues to formulate a new model for creep in olivine via multicomponent diffusion. Olivier was a master teacher, at both the undergraduate and graduate levels, with a refined pedagogical style which was didactic and philosophical, typical of a person whose first foreign language was Greek. He enjoyed teaching young students, not only in the laboratory, but also in the field. Lastly, Olivier was a warm and generous colleague who leaves a long list of protégés and collaborators in his scientific and educational legacy. He is survived by his wife, Martine, and their two children, Nicolas and Delphine.

Catherine Mével
President

Alain Weisbrod (1936–2005)

Professor Alain Weisbrod sadly died on October 18, 2005 after a long illness. He taught at the School of Geology (ENSG) and carried out research at the Centre de Recherches Pétrographiques et Géochimiques (CNRS) in Nancy.

After defending a doctoral thesis in 1970 on metamorphism in the Cévennes (France), he founded, together with Bernard Poty and Jacques Touret, a research team focused on the equilibrium between fluids and minerals. He spent one year at the Geophysical Laboratory (Carnegie Institute of Washington) to study the influence of water and manteganes on the garnet–cordierite equilibrium. He calibrated experimentally the K/Na geothermometer for fluids in equilibrium with alkali feldspars. His scientific interests also included fluid immiscibility and fluid mixing during the formation of ore deposits based on fluid inclusion studies; alpine metamorphism; oceanic hydrothermal metamorphism; boron geochemistry in hydrothermal fluids; and tin, tungsten and porphyry copper deposits.

Alain Weisbrod combined field work, the acquisition of analytical and experimental data, and thermodynamic modelling. He was among the first to introduce thermodynamics in the Earth sciences through his book Basic Thermodynamics for Mineralogists and Geologists, which was first published in French in 1963 and subsequently translated into Russian in 1966 and English in 1967. He introduced many Earth scientists to this approach, which was very new at the time.

Jean Dubessy

FROM THE PRESIDENT

As the incoming president of the Société Française de Minéralogie et de Cristallographie (SFMC), I am delighted that we have joined this new publishing initiative. The SFMC brings together French scientists in the fields of mineralogy and crystallography, but also petrology and geochemistry. It is therefore natural that we have become a partner in Elements. The first issues have been exciting, and our members are going to benefit greatly from this partnership.

The SFMC coordinates and promotes scientific activities in the field of mineralogy (s.l.) in France. We organize meetings on focused scientific topics and we sponsor symposia and special sessions at national and international conferences. We also play an active role in training and in the national community. But we also hold joint meetings with other European societies, the Deutsche Mineralogische Gesellschaft, the Società Italiana di Mineralogia et Petrologia, and now the Sociedad Española de Mineralogía. We award annually the “prix Haüy-Lacroix” to the best PhDs in the field of mineralogy (s.l.) in France. We organize meetings on focused scientific topics and we sponsor symposia and special sessions at national and international conferences. We also play an active role in training and in the national community. But we also hold joint meetings with other European societies, the Deutsche Mineralogische Gesellschaft, the Società Italiana di Mineralogia et Petrologia, and now the Sociedad Española de Mineralogía.

Our internal publication, the “Bulletin de Liaison”, is the link between our members. Joining Elements will give us more visibility on the international scene and help us strengthen our links with other societies.

Catherine Mével
President

R.C. Liebermann, F. Béjina, and J. Ingrin
The crystallization of silicate liquids is central to many processes of geological and industrial interest. Nevertheless, crystal nucleation and growth rates in silicate melts are still poorly predicted, mainly because microscopic factors that control them are not yet precisely understood. This study has concentrated on determining these factors at temperatures below the solidus, but above the glass transition (\(T_g\)). Synthetic glasses in the system CaO–Al₂O₃–SiO₂ have been heat-treated at one atmosphere, time and temperature being the two experimental variables. Experimental charges have been characterized over a wide range of scales (SEM, TEM, electron microprobe, X-ray diffraction and Raman spectroscopy) in order to determine textures, compositions, and unit-cell parameters of the crystalline phases.

The first phase to crystallize is generally one of the solidus phases. However, some metastable minerals also precipitate. At the temperatures studied, crystals are never stoichiometric and are generally enriched in Ca but have Si/Al approaching that of the parent liquid. With increasing temperature, the transition to phase compositions expected near the solidus takes place via a gradual change of Si/Al, this change being a systematic function of (\(T-T_g\)). Thus, provided that \(T_g\) of the parent composition is known, the compositions and the microstructures of devitrified materials may be predicted. These features may be explained by the relative mobilities of the different cations, the mobility of the network modifier Ca becoming several orders of magnitude greater than that of the network formers Si and Al around \(T_g\). Thus, during nucleation at large degrees of supercooling, the low mobility of Al and Si restricts the compositional field explored during random fluctuations in composition in the liquid, and thus restricts compositions of crystal nuclei. Furthermore, the enrichment of the nuclei in low-field-strength cations decreases the number of strong bonds (i.e., Si–O) that need to be reordered in order to reach a crystalline structure. These mechanisms may explain why observed nucleation rates are systematically larger than those predicted by the classical nucleation theory.

Previous considerations have empirically related crystal growth rate to the viscosity of the liquid. With this in mind, we have observed two different behaviors. When the Si/Al ratios of minerals and melt are the same, the temperature dependence of crystal growth rate (i.e., the activation energy) is identical to that of viscous flow. In the case of congruent crystallization, this may be explained because crystal growth and viscous flow have a common microscopic origin involving the breaking and formation of Si–O bonds. When the Ca content varies between melt and crystal, growth rate and viscous flow are still related because the Ca mobility is rapid relative to the characteristic life time of an Si–O bond. Conversely, when the Si/Al ratios of crystals and melt are different, the activation energy for crystal growth is significantly lower than that of viscous flow of the parent melt. To explain this observation, it is proposed that coupled diffusion of Al and Ca lowers the frequency of Al–O bond breaking, which then becomes the rate-limiting process.

The SFMC and SEG (Sociedad Española de Mineralogía) jointly organized a scientific meeting entitled “Hydrothermalism, aqueous solutions and mineralogy” held on November 3 and 4, 2005. The organizers were Prof. Fernando Rull (SEG) and Jean Dubessy (SFMC). This meeting was held in Biarritz, France, near the border between the two countries. The first of the four sessions was mainly devoted to the study of aqueous solutions with different spectroscopic techniques (vibrational), and especially those possible now with the light beam FAME available at ESRF and dedicated to Earth sciences. The second session was devoted to thermodynamic modelling in inorganic and organic systems. Solid solutions were especially considered. In addition, transport phenomena such as diffusion were also addressed. Experimental work and numerical models were always linked to natural case studies. Several papers in the third session were focused on submarine hydrothermal systems and ore deposits. The interesting case study of the Rio Tinto mine with its acidic sulfate fluids was emphasized. Finally, the fourth session dealt with acid gas storage from an experimental point of view.

As is often the case for small meetings, discussions were always lively after each presentation. It is worth noting that speakers used mostly their native language, with slides in English. This demonstrates that several languages can be used in scientific meetings, especially those involving neighboring countries.

Finally, SEG and SFMC have decided to strengthen their links and have proposed a scientific meeting to be held jointly with the Portuguese mineralogical society in the spring of 2007.

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