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Société Française de Minéralogie et de Cristallographie

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 organizing short courses, which gather large numbers of students every year. We award annually the "prix Haüy-Lacroix" to the best PhDs in the field. Of course, our activities are in French when they are addressed to the national community. But we also hold joint meetings with other societies at the European level. The last one, in November 2005, was co-organized with the Sociedad Española de Mineralogía, and was held in French, English, and Spanish!

The SFMC also shares the responsibility for publishing the *European Journal of Mineralogy*, a journal probably familiar to most of you, with three 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

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 Neuilly 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.

R.C. Liebermann, F. Béjina,
and J. Ingrin



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 manganese 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

PRIX HAÛY-LACROIX TO ROSKOSZ



Each year the SFMC awards the "Prix Haüy-Lacroix" to a young scientist for the quality of his PhD in the fields of mineralogy, geochemistry, petrology, or materials science. In 2005, it was awarded to Mathieu Roskosz, who did his PhD at the Centre de Recherche Pétrographiques et Géochimiques in Nancy, with M. Toplis and P. Richet as advisors. Dr Roskosz is now a postdoctoral fellow at the Geophysical Laboratory, Carnegie Institution of Washington, USA. The following is a summary of his research on the nucleation and crystallization of silicate melts.

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 $\text{CaO-Al}_2\text{O}_3\text{-SiO}_2$ 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 liquid 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.

SFMC AND SEM MEET IN BIARRITZ

"HYDROTHERMALISM, AQUEOUS SOLUTIONS AND MINERALOGY"

The SFMC and SEM (Sociedad Española de Mineralogía) jointly organised a scientific meeting entitled "Hydrothermalism, aqueous solutions and mineralogy" held on November 3 and 4, 2005. The organizers were Prof. Fernando Rull (SEM) 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 neighbouring countries.

Finally, SEM 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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HUBERT CURIEN, CRYSTALLOGRAPHER AND MINERALOGIST



A special meeting will be held on **MAY 19, 2006**, at the Ministry of Research in Paris, Amphithéâtre Poincaré, in memory of Hubert Curien, who passed away suddenly on February 6, 2005 at the age of 80.

He was professor of crystallography at the Laboratoire de Minéralogie-Cristallographie of Paris. Former president of the Société Française de Minéralogie et de Cristallographie, he had major responsibilities in Europe and in France, when he was Minister of Research. As a crystallographer and mineralogist, Hubert Curien had interests ranging widely from solid-state physics to mineralogy. This meeting will be dedicated to the major advances in which he was involved in the 1950s and 1960s, in the fields of Compton scattering, ionic conductivity, and the radiation effects on ionic crystals. In mineralogy, his contributions included the determination of the structure of several minerals, the early development of the electron microprobe, and the significance of structural defects. A new mineral was named after him—curienite, $\text{Pb}(\text{UO}_2)_2\text{V}_2\text{O}_8 \cdot 5\text{H}_2\text{O}$. Several colleagues who worked with him, as well as younger researchers active in these areas, will participate to this meeting, which will show how fascinating it is to conduct research outside classical tracks.

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