

## OBITUARY

### JOSÉ FRIPIAT 1923–2014



Professor José J. Fripiat, the prominent scientist and teacher who contributed so much to the surface and solid state science of minerals and that of clay minerals in particular, died February 17, 2014 in Mexico City, at the age of 90. It is not too much to say that our community has lost one of the founders of modern clay science and one of the most versatile materials scientists.

Born in summer 1923, Pr. José J. Fripiat, graduated in 1946 from the Université Catholique de Louvain (UCL), Belgium, in chemistry. His master thesis was on the relationship between polarisability and molecular spring constants, illustrating already his lasting interest in physical chemistry, spectroscopy and fundamental questions. Yet, it is not in a traditional university environment that he started his research career. The world was still in the final years of colonial empires and the opportunity was offered to him to join the National Institute for Agronomic Studies in what was then the Belgian Congo. We are lucky that he caught this opportunity for it is there, in one of the hotspots of tropical agronomy, that he discovered the world of soil minerals and could express for the first time his talent for scientific excellence while addressing practical problems. Understanding and

improving the mechanisms of soil fertility was a challenge where, he felt, physical-chemistry would be helpful.

Back to Belgium in 1949, after a doctorate degree obtained for his work on infrared spectroscopy, two awards of the Royal Academy of Sciences of Belgium and a postdoctoral year with Peter Debye, then at Cornell University, he was appointed assistant professor in physical chemistry of soils at the Agronomic Institute of UCL. Then began an incredibly productive period of over twenty years, during which the young laboratory of soil physical chemistry, hosting the first transmission electron microscope of Belgium in 1952, became the world-renowned Laboratoire de Physico-chimie Minérale. Associate professor (“chargé de cours”) in 1953 and full professor (“professeur ordinaire”) at the Faculty of Agronomy in 1959, Pr. Fripiat authored and co-authored more than two hundred scholarly papers during this period, applying surface chemical and spectroscopic methods to the study of clays and related silicates or oxides not only for soil science problems but also for catalysis, petroleum geochemistry, cement chemistry, glass science and even the origin of life. Groundbreaking results were obtained

in all these fields. Quite naturally in view of his past interests, infrared spectroscopy was the first spectroscopic method intensively used, in parallel with what was happening in Spain, UK and in the US. This was soon followed by nuclear magnetic (NMR) relaxation which at that time was still a very young technique. Dielectric spectroscopy was used in parallel. Electron spectroscopy for chemical analysis (ESCA or, more precisely, XPS) was applied to clay science and catalysis a few years later. The mobility of protons in clay crystal networks, the mobility of protons in adsorbed layers at room or at high temperature (water, alcohol and ammonia), the adsorption and the reactivity of amino acids and peptides adsorbed on clay minerals, the use of clays for the synthesis of what would now be called hybrid or nanocomposite materials, the surface chemistry of silica and silico-alumina, the role of clays in petroleum genesis and migration, or in the origin of life, those are the main topics on which he concentrated his interests during those years.

In 1972, while still professor at UCL, he accepted a professor position at the University of Illinois, sharing his time and energy between Leuven and Urbana-Champaign. Two years later, in 1974, he was offered the position of director of the 'Centre de Recherche sur les Solides à Organisation Cristalline Imparfaite' (CRSOCI) of the French 'Centre National de la Recherche Scientifique' (CNRS) in Orléans, which he accepted. Founded by Jacques Méring, the CRSOCI was a worldwide reference laboratory for the structural science of clays and carbons. Pr. Fripiat turned it into a reference place for their physical chemistry also. Those were years of fruitful collaboration with the late Maribel Cruz-Cumplido, then his wife, who died prematurely in 1981. In the context of a growing interest for renewable energies and solar energy in particular, he initiated work on the photochemistry and the photocatalytic properties of dye molecules and organometallic complexes adsorbed on clay minerals, while still pursuing research on water in clay minerals and on organoclays. This work led to one of the very few photochemical systems showing some activity for the decomposition of water in sunlight. Pr. Fripiat was one of the three final nominees for the International BP prize for energy in 1982, among eighty selected candidates. In a different field, applying the recently developed theory of fractals,

he proposed a theoretical model for multilayer adsorption on rough surfaces, which is an elegant extension of the celebrated BET theory for multilayer adsorption and surface area measurements. It was also in Orléans that he started working on the so-called hydrogen bronzes of transition metal oxides.

This is the point where most of us would have enjoyed retirement or emeritus status, but this was way too early for José Fripiat. In 1986, he became distinguished professor of chemistry at the University of Wisconsin, Milwaukee (UWM), and started a second career in the field of materials for catalysis. Twelve more years of intense work were to pass devoted to the synthesis and the structural or surface chemical study of zeolites and mesoporous solids, mainly by high resolution NMR.

And that is not the end of the story. Retired from UWM, it is at the Mexican Institute of Petroleum in Mexico City that Professor Fripiat chose to continue in the same field, in collaboration with Graciela Pacheco at the University of Mexico, now his widow. Less than two months ago, he was still looking forward to start a research project on mineral-bitumen interfaces.

Professor Fripiat was the author of more than 300 scientific papers and two books. He received numerous awards, among which the Francqui prize, the highest scientific award in Belgium. He was member of the Belgian Academy of sciences and foreign member of the French Academy of Agriculture. He has been president of the Association Internationale Pour l'Etude des Argiles (AIPEA) from 1973 to 1975 and was AIPEA Fellow in 2005.

A demanding but also generous and inspiring teacher, mentor and leader, a man of heart and action, Professor Fripiat was an exceptionally strong personality who has left his imprint on generations of colleagues and students all over the world. Looking for honours was never his motivation. Doing good and useful science has always been his passionate driving force.

José Fripiat is survived by his wife Graciela, three sons, three daughters, sons-in-law, daughters-in-law, and fifty grandchildren and great grandchildren. We express our deepest sympathy to all of them and to all his relatives.

On behalf of all his students and colleagues

Henri van Damme and Faiza Bergaya