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Enrique San Román (1945 – 2019)

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ABSTRACT

An homage to the Argentinian Photochemist Enrique San Román is presented. Enrique led the Photochemistry and Chemical Kinetics research group in the Department of Inorganic, Analytical and Physical Chemistry in the Faculty of Exact and Natural Sciences of the University of Buenos Aires from 1984 until his death in July 2019. He left a strong legacy in Chemical Kinetics and Photochemistry in Argentina. He is remembered as a meticulous and very knowledgeable scientist and teacher, a loyal friend and a generous and integer human being.

It is with deep sadness that we write this biographical sketch of our dear colleague, friend and mentor Enrique San Román, who passed away on July 16th, 2019, and to whom a session was dedicated during the last Encounter of Latin-American Photochemists (ELAFOT) held in Viña del Mar, Chile, in November 10th-14th, 2019.

<insert photo or photos here>

Enrique studied Chemistry at the College of Sciences (Faculty of Exact and Natural Sciences, FCEN) in the University of Buenos Aires (UBA), where he received his degree of “Licenciado” in Chemistry in 1968. The University of Buenos Aires suffered an Institutional breakdown in 1966, after the military putsch in June 1966, the intervention of the Universities by the militaries a month later, and the violent episode known as “The Long Sticks Night” on July 29th, 1966. That night police forces entered the FCEN where students and Professors were gathered discussing the situation, and many were victims of the violent attack. Immediately after the events, about 84 % of the Professors and Assistants at the FCEN resigned from their posts and a large number of them left the country. The students (Enrique among them) had to resource to different ways to complete their degrees and find alternative financing and a place for their graduate studies. This was not easy in Buenos Aires at that moment. In Argentina, moving from Buenos Aires to another city to perform graduate studies was and is not common even today. After finishing his studies in Buenos Aires, Enrique went to INIFTA (Institute of Theoretical and Applied Physical Chemistry), in the City of La Plata, to the laboratory led by Hans Schumacher to work in the domain of Gas Phase Kinetics. After completing the experimental part of his doctoral thesis,¹ Enrique spent almost two years in Karlsruhe, Germany, studying the hydrated electron produced during pulse radiolysis in liquid ammonia in the research group directed by Peter Krebs.

Upon his return to La Plata in 1976, he presented his thesis with the work performed in La Plata on “Kinetic Studies of the Mono- and Tri-fluoro Chloride in the Fluor-Chlorine-ClF mixture” and defended it at the University of Buenos Aires. He remained in INIFTA where he developed the first laboratory of Fast Kinetics in Argentina, with a self-made microsecond flash photolysis equipment,² and became Assistant Researcher of CONICET, the Argentinian National Research and Technology Council.

In 1984, after the recovery of democracy in Argentina, Enrique accepted the invitation to join the re-founded Department of Inorganic, Analytical, and Physical Chemistry (DQIAQF), in the FCEN at the University of Buenos Aires, directed by Roberto Fernández Prini, and took up the difficult challenge to build from scratches, from literally nothing, a group on Photochemistry and Chemical Kinetics in the devastated DQIAQF. Together with Lelia Dixelio (also holding a PhD degree obtained under the guidance of Hans Schumacher), with Josefina Awruch from the College of Pharmacy who could synthesize tetrapyrrols, and with the first graduate students in the group (María Gabriela Lagorio and Martín Negri and soon afterwards Anita Zalts and Marta Daraio), research projects on phthalocyanines in solution and in microheterogeneous media were developed, which obtained the financial support of the Volkswagenstiftung (Germany). This helped acquiring basic steady-state absorption and fluorescence equipment. In 1988, Pedro Aramendía joined the group after his post-doctoral stay in Mülheim (Germany) in the group of Silvia Braslavsky. Enrique and his collaborators implemented photochemical techniques with ingenuity, technical ability and great creativity. In the ‘90s, steady-state thermal lensing and, after arrival of the Nd-YAG laser, ns-flash photolysis and laser-induced optoacoustics were home-built and implemented, including the writing of programs for acquisition and elaboration of the data. Equipment for ns emission lifetimes determinations was also installed. New research directions were started by the group.³

The Photochemistry group led by Enrique was one of the five research groups (the other groups were on Inorganic Chemistry, Analytical Chemistry, Thermodynamics, and Electrochemistry) that constituted the backbone of the DQIAQF, which received an important grant of 4.6 million DM (German Marks) in 1991 from the German Office for Technical Cooperation (GTZ), essential for completing the necessary general infrastructure of the DQIAQF, providing basic equipment for each group, and enabling an extensive program of exchange of students and senior researchers between Argentina and Germany. The first two graduate students in the group (M. G. Lagorio

and M. Negri) successfully defended their PhD thesis in 1991. Later on, the four graduate students working from the beginning in the group attained professorships at UBA and General Sarmiento National University. In 1992, the Photochemistry group led by Enrique was one of the groups constituting the INQUIMAE (Spanish acronym for Institute for the Physical Chemistry of Materials, Environment and Energy) as an Institute within the FCEN that became a CONICET-UBA Institute in 1995. In 1993 Enrique (then Associate Professor) became Director of the Department (DQIAQF) and in 2001, Full Professor of Physical Chemistry in the Department.

Based on his earlier work on gas phase kinetics and attending the urgent need of learning about and controlling the air pollution levels in Buenos Aires, Enrique established in 1995 a separate group on Atmospheric Chemistry and a special laboratory was newly equipped within INQUIMAE, in which over the years the levels of contaminant gases in the metropolitan area of Buenos Aires were evaluated. These projects were very successful in technical terms and were recognized by awards for the group involved in the projects. Later, Enrique and the group working on air pollution established contracts with ALUAR (the Argentinian factory producing Aluminium in the South of Argentina) for the measurement of contaminants in Puerto Madryn as well as with YPF (the Argentinian Petroleum Company) to measure the particles emitted in the Industrial Complex that YPF operates in Ensenada (Buenos Aires Province). These projects pioneered air monitoring and industrial pollution in Argentina, introduced big industry into air quality control, and brought important financial benefits for INQUIMAE.

Over the years, the projects in photophysics and photochemistry in micro-heterogeneous phase were gaining preeminence, also through the need of finding proper media and conditions to embed sensitizers for the remediation of contaminated waters using solar light. Important findings were made regarding the mechanism of enhancing triplet yields in overcrowded dyes adsorbed on cellulose.⁴

A diversification of projects in structured media took place within the group, some devoted to the measurements of dyes *in vivo* in animals and in fruits, some to the measurements in textiles, some on films, and some others to the interpretation of emission data obtained remotely from crops and forests. A recent important paper summarizes the progress made on the understanding of the photophysics of dyes in various structured media.⁵

Several PhD, Master and undergraduate students as well as regular students and post-doctoral visitors were guided by Enrique, who was always present fixing technical problems in the labs, in addition to planning the experiments and discussing the results. In turn, his students, and his post-doctoral collaborators, established with their own groups, have guided and continue guiding several graduate students. Enrique's legacy in the domains of Photochemistry and Chemical Kinetics is thus broadly established in Argentina.

Enrique and his collaborators have been active participants in the meetings of the Argentinian physical chemists, of the Latin-American photochemists (the ELAFOT meetings) in which he and his group have participated since 1988, and of the Argentinian photobiologists (GRAFOB) meetings. He delighted us with a very meticulous plenary lecture about the photoinduced processes in non-homogeneous media during the ELAFOT meeting in Carlos Paz (Córdoba, Argentina) in October 2017. During that week, we enjoyed sharing with Enrique lunches and dinners while talking about films and theater pieces, political and general academic issues and were often amused by his witty remarks.

The national and international connections established by Enrique were successful and always involved strong personal contacts. He collaborated with Argentinian research groups in Mar del Plata, La Plata and Rio Cuarto, and participated in the 1996-99 EU-INCO project "Development of environmentally friendly photo-activatable compounds for treatment of microbially polluted water" including Argentina, Spain, Tunisia, Morocco, Hungary, Israel, and Italy, the 1998-2002 project with Beate Röder (Humboldt University, Berlin) on "Photosensitizers in the solid state" financed by DAAD (Germany) and SECyT (Secretary of Science and Technology, Argentina), the 2008-2010 project with E. M. Talavera and J. M. Álvarez (University of Granada, Spain) on "Photophysical studies of fluorophores included in polymeric matrices and evaluation of the application in processes of environmental importance", and the 2010 – 2011 project with Luis F. Vieira-Ferreira (University of Lisboa) financed by MINCyT (Minister of Science, Technology and Productive Innovation, Argentina) and FCT (Foundation for Science and Technology, Portugal). He also collaborated with André Braun and Esther Oliveros, Karlsruhe, José Luis Bourdelande, Barcelona, and with Silvia Braslavsky (one of the undersigning). During his last visit in Mülheim for some weeks in 2004, he designed a special cuvette for laser-induced optoacoustic measurements in compressed samples under controllable pressure, which

was produced in the workshops of the Max Planck Institute in Mülheim and afterwards used very successfully in Enrique's lab in Buenos Aires.⁶

Within the Sub-Committee on Photochemistry of IUPAC, Enrique led, together with Fred Brouwer, an ambitious and long-term IUPAC project about Fluorescence Standards. Eight important documents were elaborated, each of them by specialists on each of the subjects. Because he was very humble, and although he read and coordinated all of the papers in the project, Enrique did not sign any of the documents.⁷

Enrique was also a very dedicated teacher. His commitment to education and to science itself was very deep. For many years, he held lectures in all areas of Physical Chemistry in the DQIAQF. He also pioneered graduate courses on Chemical Kinetics, Photochemistry, and Spectroscopy. In parallel, he offered courses on Air Pollution and on Atmospheric Chemistry for the first time in the Master curriculum of Environmental Chemistry. All his classes showed excellent original material, sometimes developing special computer programs to illustrate physical chemistry processes, and was frequently invited to lecture on kinetics and on photochemistry in other Universities and Institutes. The graduate course on Photochemistry offered by Enrique together with Lelia Dixelio, Rosa Erra, Pedro Aramendía, and M. Gabriela Lagorio during the last years in the FCEN in the second semester was a great hit for the students and also for the co-lecturers. Enrique showed a high institutional compromise as well as a high level social engagement during all his life. In fact, in his capacity as "Profesor Consulto" of the FCEN, he lately was an active participant of a Committee on PhD degrees of the UBA and took part in a committee meeting the day before his passing. He was very optimistic and very courageous confronting his illness.

He was an excellent team worker and was known for his extraordinary generosity. Not only did he make available the equipment of his laboratory to other groups from the same faculty but also from other academic institutions, without even appearing as co-author of the published works.

The grill-parties for the research group that Enrique and his long-time life partner, Marta, frequently offered in their house-refuge on the Parana Delta contributed to the excellent working climate in the group and are very fondly remembered.

Enrique's meticulous planning and controlling of experiments and, very specially, his ultra-careful writing of projects and papers is constantly remarked by his collaborators. Remembering him, many of his virtues come to mind, but above all, we remember him as a great loyal friend and as a marvelous integer person.

The photochemical community will certainly miss Enrique's presence, his clear thoughts, his very special sense of humor and even his sometimes biting critical remarks.

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