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Nicholas J. Turro (1938–2012)

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Nicholas J. (Nick) Turro, the William P. Schweitzer Professor Chemistry at Columbia University, who laid the foundations for modern organic photochemistry, supramolecular photochemistry, and spin chemistry through his imaginative and pioneering research, passed away on November 24, 2012 following a courageous battle with cancer. Turro's research over a period of five decades was characterized by a remarkable breadth, encompassing synthetic organic chemistry, colloidal and interface chemistry, physical chemistry, magnetic resonance theory and its applications, mechanistic aspects of molecular and supramolecular organic and inorganic chemistry, materials chemistry, biological chemistry, and sophisticated experimental techniques.

Turro was born in Middletown, Connecticut (USA) on May 18, 1938, and had his early education at Wesleyan University in Middletown. He received his PhD from the California Institute of Technology in 1963, working with George S. Hammond, and did a one-year postdoctoral study in the laboratory of Paul D. Bartlett at Harvard. In 1964, he joined Columbia University as an instructor and became professor in 1969. He was also an outstanding administrator, as evident from his being the Chair of the Chemistry Department (1981–1983) and Co-Chair of the Chemical Engineering Department (1997–2000). Turro's breadth in science and engineering was recognized by his role as not only the William P. Schweitzer Professor of Chemistry, but also and Professor of Chemical Engineering and Applied Chemistry from 1997, and Professor of Earth and Environmental Engineering in the H. Krumb School of Mines from 1998.

Turro was an exceptionally productive chemist who was able to achieve distinction and create excitement in a wide range of areas of chemistry by making deep intellectual and scientific penetration at the interfaces of organic chemistry with chemical physics, biology, and materials science. His significant achievements and substantial contributions to chemistry include pioneering developments in the fields of cyclopropanone chemistry, mechanistic organic photochemistry, chemiluminescent organic reactions, the general theory of organic photochemistry, magnetochemistry of organic molecules, direct spectroscopic detection and characterization of carbenes and biradicals, organic photochemistry in micelles and zeolites, photochemical characterization of dendrimers and DNA, supramolecular control of radical reactivity through supramolecular and magnetic effects, use of EPR to elucidate organic reaction mechanisms, and the use of photochemical methods to unravel long-standing issues in polymer chemistry. During the last decade, Turro extended his breadth in research to provide important contributions in the areas of enantiomeric selectivity in the reactions of singlet oxygen, the development of novel photoluminescent probes for imaging biomolecules, and the demonstration of spin chemistry of hydrogen molecules incarcerated inside a fullerene. Turro summarized his own contributions and interests in an inspiring Perspective Article published in 2011, written while battling cancer.[1]

Turro's first textbook on organic photochemistry published in 1965 set an intellectual and pedagogic style for understanding and investigating the mechanisms of organic reactions that served as an exemplar for the teaching and execution of research in the field for nearly half a century. The second edition published at the end of 1970 has since been an enduring standard for teaching and learning the fundamental principles of physical organic photochemistry. A much-anticipated expanded and updated version of the book was published in 2010 and, as expected, received excellent reviews. These books reflect Turro's unique ability to organize complex information, seemingly unrelated to most others, from a wide range of subjects, in a very logical and retrospectively simple manner.

Turro's accomplishments have been recognized by his peers through major national and international awards. He was elected to the National Academy of Sciences and the American Academy of Art and Sciences in 1981. He has also been awarded the American Chemical Society's Pure Chemistry Award and the James Flack Norris Award. In 2011, he was awarded the A. C. Cope Award, the highest award in organic chemistry by the American Chemical Society for "laying the foundations for modern organic photochemistry, supramolecular photochemistry, and spin chemistry through his imaginative and pioneering research". The inaugural G. S. Hammond Award by the Inter-American Photochemical Society was presented posthumously to him in January 2013. In addition to his signal accomplishments as a research scientist, Turro was recognized as an educational leader who made a national impact through his teaching, mentoring, scholarship and outreach activities. He was an early pioneer in employing modern learning technologies in classroom that enabled students to learn and grasp concepts with ease. His teaching accomplishments were recognized by many awards, including his selection as a Distinguished Teacher Scholar by the National Science Foundation for 2002.

Turro also had an interest in philosophy of science and he generously used words such as "paradigms", "normal science" and "pathological science" in conversations and integrated these

concepts in his teachings and training students. Examples include a Review published in *Angewandte Chemie* in 1986 on "Geometric and Topological Thinking in Organic Chemistry", and his Essay "Paradigms Lost and Paradigms Found: Examples of Science Extraordinary and Science Pathological—And How To Tell the Difference", published in this journal in 2000.

Over a period of five decades, Turro published close to 1000 journal articles, which often had the "photon as a reagent for initiating photoreactions and as a product of deactivation of electronically excited molecules" as a central theme, which is also how he summarized his work on his homepage. He trained over 500 postdocs, graduate students, undergraduate students, and visitors. Through them, the legacy of Turro will live on. Every one of his students, associates, and colleagues know his selflessness in sharing his knowledge and his willingness to spare any amount of time to explain concepts using physically intuitive models.

Turro had a happy personal life that he cherished. He leaves behind Sandy, whom he married in 1960, two daughters and five grandchildren. In addition to this biological family, Turro, together with full support from his wife, treated all those who passed by his laboratory as members of his extended "chemistry" family. He treated every human being he knew with respect and love and was genuinely interested in their well-being. Turro's passing is an enormous loss to science and all who knew him are sure to feel they have lost a part of themselves.

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[1] N. J. Turro, *J. Org. Chem.* **2011**, *76*, 9863 – 9890
[2] N. J. Turro, *Angew. Chem.* **1986**, *98*, 872 – 892.
[3] N. J. Turro, *Angew. Chem.* **2000**, *112*, 2343 – 2348.

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