

Preface

Preface to this special issue in honour of Prof. Renato Ugo on the occasion of his 65th birthday



Renato Ugo, born in Palermo on 18 June 1938, earned his degree in Industrial Chemistry in 1961 from the University of Milan where he performed his entire academic activity. In 1962, he was Post-Doctoral Fellow with Lamberto Malatesta (Donegani fellowship from Accademia dei Lincei) and Lecturer for practical exercises in Chemical Preparations. From 1964 to 1973 he was Lecturer in Analytical Chemistry. During this time he spent 1 year (1965) as Post-Doctoral NATO Research Fellow at the University of Sheffield (UK) and became “Libero docente” in General and

Inorganic Chemistry (1966, he was awarded this qualification prior to prescribed terms by virtue of his scientific merits). In 1973, he became Full Professor of Analytical Chemistry and since 1981 Full Professor of General and Inorganic Chemistry. In 1974, he was visiting Professor at the University of Western Ontario (Canada). In 1988, he received a doctor degree *honoris causa* from Clarkson College—Postdam, NY (USA).

Up to 1998, Renato Ugo was Editor in Chief of two series of International Advances, i.e. *Aspects of Homogeneous Catalysis* (7 volumes) and *Homogeneous*

Catalysis in Inorganic and Organic Chemistry, this latter in association with Prof. B. James of the University of Vancouver (18 volumes) published by Kluwer (The Netherlands). He was a member of the Editorial Board of *Journal of Molecular Catalysis*, *Gazzetta Chimica Italiana*, *Advances in Catalysis*, *Nouveau Journal de Chimie*. He was a founder and a member of the International Board of International Symposium on Homogeneous Catalysis, of the International Symposium on Activation of Dioxygen Species and Homogeneous Catalytic Oxidations, and of the International Board of the International Symposium on Relations between Homogeneous and Heterogeneous Catalysis. He also organised many international schools, symposia, workshops and congresses. In particular, he organised three international schools of Advanced Inorganic Chemistry and an interdisciplinary Catalysis Workshop in Italy for NATO. In the frame of the co-operation between Italian CNR and American NSF he was responsible for the organisation of two Homogeneous Catalysis Workshops held in Italy. He acted as chairman of *III International Symposium on Homogeneous Catalysis* held in August 1982 in Milan.

Recognition of the scientific achievements of Renato Ugo appears in a series of lectureships and awards. He delivered many scientific presentations in a large number of international and national congresses on Co-ordination or Organometallic Chemistry and on Catalysis, and attended invited seminars in many universities and industrial research centres in Italy, in Europe including East Europe and in other non-European countries such as the USA, Canada and Brazil. He is the only scientist invited to give plenary lectures to all three of the most important International Conferences or Symposia on Catalysis: *International Congress on Catalysis* (Palm Beach, USA, 1972), *International Symposium on Homogeneous Catalysis* (Corpus Christi, USA, 1978) and *International Symposium on Relations Between Homogeneous and Heterogeneous Catalysis* (Lyon, France, 1977; Balatonfured, Hungary, 1995). He was invited to give the following relevant international lectures: *Esso Lecture* (Belfast, UK, 1972), *British Council Lecture Tour* (Glasgow, Edinburgh, Cambridge, Canterbury and Bristol, UK, 1973), *Lecture Tour of the Belgium Catalysis Group* (Liege, Namur, Louvain la Neuve, Louvain, Belgium, 1980), *F. Gault Lecture Tour*

(Manchester and Glasgow, UK, Leiden and Amsterdam, The Netherlands, Liege, Belgium, Innsbruck, Austria, Munich, Germany, Lund, Sweden, 1982), *The B.P. Lecture* (Ottawa, Canada, 1997). Renato Ugo was awarded the Bracco-Salata prize (1963) and the Stampacchia prize (1965) for his scientific activities as a young researcher. He was then awarded the Miolati prize (1987) from Padua University and the gold medal of the President of the Italian Republic for advancement in science (2000). In 1984, he became a corresponding member of the “Accademia Nazionale dei Lincei” and since 1988 he has been a national member. Since 1984 he has also been the President of the Italian Association for Industrial Research (AIRI).

Renato Ugo's contribution to research is considerable and is mirrored by the international recognition he has received and by more than 200 publications and reviews published in the most qualified journals. His main topics of research are: (i) *Inorganic and Co-ordination Chemistry*; (ii) *Organometallic Chemistry*; (iii) *Homogeneous Catalysis*; (iv) *Relations between Homogeneous and Heterogeneous Catalysis*; (v) *Surface Organometallic Chemistry and Surface Mediated Organometallic Synthesis*; (vi) *Heterogeneous Catalysis*; (vii) *Molecular Materials for Non Linear Optics*.

In particular, in the field of *Inorganic and Co-ordination Chemistry*, he studied the problem of symmetrical hydrogen bond discovering in 1965 the anion $[\text{H}(\text{NO}_3)_2]^-$, a species of significance in nuclear fuel regeneration technology. He studied the conformational analysis of co-ordination compounds through circular dichroism spectroscopy; of particular interest are a set of 6 Notes on the stereochemistry of complexes with optically active Schiff bases and studies on optically active Pt(II) complexes as models of anti-cancer agents. These studies were the basis for the development of enantioselective catalysts for epoxidation and related reactions.

He was one of the first in Italy (1970–1973) to work on mimetic models of metal biological systems in particular on dioxygen adducts of Schiff bases complexes of Co(II) and on amino acid complexes of Co(III).

In the field of *Organometallic Chemistry*, he studied and successfully developed the chemistry and reactivity of organometallic complexes in low oxidation states. Of special significance are the studies on chemistry of Pt(0) compounds, discovered in 1957

by his teacher Lamberto Malatesta, which led to the publication of 12 papers. In this period he also worked on rhodium complexes with tertiary phosphines and on compounds with metal-to-tin bonds (incidentally, he published the preparation of the well-known $[\text{Rh}(\text{PPh}_3)_3\text{Cl}]$ compound in the same issue of *J. Chem. Soc.* simultaneously with the Nobel prize winner George Wilkinson). He completed some important kinetic works on the reactivity with dioxygen of complexes in low oxidation states. His work specifically contributed to the understanding of catalytic oxidation mechanisms including enzymatic oxidations.

In *Homogeneous Catalysis*, since 1967 he has been one of the first scientists promoting academic studies on homogeneous catalysis with complexes of the transition metals. This activity granted him many international honours, as he was invited to give plenary lectures in the most qualified congresses and meetings on homogeneous catalysis. It is worth mentioning here 12 papers on catalysis with palladium salts, 7 papers on catalysis with cobalt carbonyl complexes and 7 papers on catalysis with transition metal complexes.

He was a pioneer in the field of *Relations between homogeneous and heterogeneous catalysis*. His first works date back to 1967–1968. The Plenary Lecture given on this subject in 1972 at IV International Catalysis Congress (heterogeneous) is highly significant. An important review article was published in the *Catalysis Review* in 1975, where the molecular metal cluster concept as a model of a surface or of a metal particle was discussed for the first time. Renato Ugo contributed in outlining the molecular approach to the interpretation of catalysis by metals and in general of surface processes of heterogeneous catalysis.

The subject *Surface Organometallic Chemistry* is related to the previous field of research as its logic conclusion. It is based on the study of the interaction of metal carbonyl clusters with inorganic oxide surfaces like silica, alumina and magnesia. In 1977, Renato Ugo, in a pioneering work together with the group headed by Jean-Marie Basset of CNRS at Lyon, interpreted and developed such field of surface chemistry. In addition, he simultaneously started working on carbon monoxide reduction to hydrocarbons, studying it with a molecular approach. He can be considered, together with Basset, the founder of this new branch of organometallic chemistry.

Recently he has also studied the synthesis, characterisation and reactivity of complexes with silanol ligands that mimic the surface of silica. These are models of the molecular interaction between an organometallic compound and the silica surface and their reactivity allows a better understanding of the mechanisms of aggregation to form metallic nanoparticles.

Surface Mediated Organometallic Synthesis is a subject of research, which originated from the deep knowledge of *Surface Organometallic Chemistry*. Renato Ugo discovered that the silica surface as such can be an extremely efficient medium for the synthesis with high yields, high selectivity and under mild conditions of a series of metal carbonyl complexes and metal carbonyl clusters. By the addition to the silica surface of an alkali carbonate, metal cluster anions can be synthesised as well, without the need for superbases. This new methodology of synthesis now allows the preparation of large quantities of metal carbonyl clusters of high nuclearity, which up to now could only be prepared by difficult and low yield synthetic routes.

Renato Ugo is acting in the field of *Heterogeneous Catalysis* by preparing new metallic catalysts also using the Vapour Phase Deposition technique. By decomposition on metal oxides of adsorbed metal carbonyl clusters or of volatile organometallics deposited from vapour phase inside zeolites he prepared new metallic catalysts. The structures of these new metallic catalysts, which show different properties from the traditional ones, were studied with advanced spectroscopic techniques (EXAFS, DRIFTS, ESCA, etc.).

Molecular Materials for Non Linear Optics (NLO) is a new field of research, where Renato Ugo studies co-ordination and organometallic compounds as materials with NLO properties. In particular, he investigated the enhancement of the NLO properties of push-pull of organic molecules by co-ordination to organometallic compounds. He also set-up the first Italian laboratory, and one of the few in Europe, for NLO measurements of molecules and materials in solution (EFISH technique) and as microcrystalline powder (Kurtz-Perry technique).

In addition to his academic and scientific activities, Renato Ugo has developed an intensive public and professional activity in the management of research and research policy field.

However, no comment on the achievements and work of Renato Ugo would be complete without a word about his pleasant character, about his hospitality for guests or visitors and about his enthusiasm for work. Extremely precious are also his magic way of teaching and his ability to guide, inspire and encourage his students to develop their own ideas. An innumerable number of friends, colleagues and students appreciate him as man and scientist. A few could participate in this special edition of the *Journal of Molecular Catalysis A: Chemical* in honour of his 65th birthday, others could not, although they would have liked very much to contribute. Lamberto Malatesta wishes “to Renato, who has been my best student and coworker, many years of scientific and professional successes”. Fred Basolo and Hubert Mimoun wish him a “Happy Birthday” and Jack Lewis “all success and joy in his chemistry”. Many other re-

searchers around the world, including ourselves, acting or not in the field of catalysis, will remember him as a wonderful teacher or good friend for life. It is a pleasure for us to work with him and we hope that we can enjoy his contagious enthusiasm for many more years.

The Guest Editors

Dominique Roberto
*Dipartimento di Chimica Inorganica
Metallorganica e Analitica
Università degli Studi di Milano
Via G. Venezian 21, 20133 Milano, Italy*

Rinaldo Psaro
*CNR, Istituto di Scienze e Tecnologie Molecolari
via C. Golgi 19, 20133 Milano, Italy*