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EDITORIAL

Introduction to the themed issue in honour of Prof. Didier Astruc. A success story from electron reservoir complexes to dendritic molecular nanostructures

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Didier Astruc was born in Versailles, France, in 1946. He completed his undergraduate studies in chemistry at the University Rennes 1, where he received his PhD in 1975 under the guidance of Prof. R. Dabard, before carrying out postdoctoral research in 1977 at MIT (Cambridge, MA, USA) with Prof. R. R. Schrock (2005 Nobel Laureate). Following this position, Didier went back to Rennes as a CNRS fellow; he was promoted to Professor of Chemistry at the University Bordeaux 1 in 1984. Didier spent the 1990–91 sabbatical year with Prof. K. P. C. Vollhardt at U. C. Berkeley, where he wrote his first book, *Electron Transfer and Radical Processes in Transition-Metal Chemistry*, prefaced by 1983 Nobel Laureate H. Taube.¹ In 2000, he published a textbook in French *Chimie Organométallique*² that was translated first into Spanish³ and then into English, up-dated and completed to become *Organometallic Chemistry and Catalysis*.⁴ Didier has also co-edited a volume of the handbook *Electron Transfer in Chemistry* with V. Balzani and J. Matay,⁵ and has edited several books, including *Modern Arene Chemistry*⁶ and *Nanoparticles and Catalysis*,⁷ as well as several special journal issues, among which was the themed *NJC* issue *Mechanisms and Processes in Molecular Chemistry*⁸ in honour of B. Tchoubar.⁹

In 1979, Didier coined the term organometallic “Electron Reservoirs”,¹⁰ a well-known concept that he extended further to reservoirs of protons, hydrogen atoms and hydrides. He also prepared the first “electron reservoir”, $(\eta^5\text{-C}_5\text{H}_5)\text{Fe}(\eta^6\text{-C}_6\text{Me}_6)$,

the hallmark of this family of genuine 19-electron iron(i) compounds.¹¹ These thermally stable mixed-sandwich complexes are still the most electron-rich molecules known and were shown to be able to reduce a wide variety of compounds stoichiometrically and catalytically.¹² Of all these reactions, the most spectacular one is the reduction of O_2 to superoxide as it occurs within seconds at ambient or sub-ambient temperature by benzylic C–H activation upon contact with air, thus allowing further useful functionalisation.¹³ Moreover, this reactivity can be totally inhibited by the simple salt Na^+PF_6^- due to double-ion exchange between the superoxide and the sodium salt ion pair.¹⁴

In 1979, while still in Rennes,¹³ Didier also disclosed the first $(\eta^5\text{-C}_5\text{H}_5)\text{Fe}^+$ -induced peralkylation of polyalkylarenes by sequential deprotonation-alkylation iterations. This simple one-pot multistep iterative reaction¹⁵ paved the way to dendrons and dendrimers, particularly the synthesis of the new “*p*-phenol-triallyl” dendron, a key brick that led to the construction of various kinds of star-shaped and dendritic nanostructures, an area that he extensively developed together with his research group in Bordeaux.¹⁶ Didier’s “dendrimer show” concerns dendritic molecular batteries and “green” catalytic processes (olefin metathesis, C–C coupling, catalysis in water) using nanoreactors.¹⁷ Since the late 1990s, Didier has developed an original molecular engineering approach to functional gold and palladium nanoparticles with nanoscience applications

in templating and encapsulation for molecular recognition, sensing, “homeopathic” catalysis and, recently, nanomedicine.¹⁸ This success story spanning organometallics to dendrons, dendrimers and nanoparticles is described in more than 360 research papers. Didier is in the 2011 Thompson–Reuters list of the top 100 chemists who have achieved the highest citation impact scores for their chemistry papers published between 2000 and 2010.¹⁹

For his many outstanding scientific achievements, Didier was awarded the Prize of the Coordination Chemistry Division of the Société Chimique de France (SCF) in 1981, the German–French Humboldt Prize (1989), the Iberdrola Prize (1999), the Grand Prix Le Bel of the SCF (2000) and the Gold Medal of the Italian Chemical Society (2009). In 2008, he was recognised as Gauss Professor at the University of Göttingen (Germany). He has been invited to give named lectures, including the Watt Lecture at the University of Texas at Austin and the 3M Lecture at the University of Western Ontario in London, Canada.

Didier has been a senior member of the Institut Universitaire de France (IUF) since 1995, and has been elected as a Fellow of the Royal Society (2005), and to the membership of the Academia Europaea (2006), the German Academy of Sciences Leopoldina (2006), the European Academy of Sciences (2007) and the European Academy of Sciences and Arts (2010).

Didier has served on many editorial boards, including *Organometallics*, *New*

J. Chem., J. Inorg. Organomet. Polym. Mater., Curr. Chem. Biol., J. Organomet. Chem. and Appl. Organomet. Chem. In addition, he has been active in the Coordination Chemistry Division of the SCF, serving as President from 2000 to 2004.

Didier has been closely associated with the *New Journal of Chemistry*, serving on the editorial board from 1990 to 1997 and then on the International Advisory Board for another seven years (2001–7). He has published more than 20 papers in the journal since it was launched as *Nouveau Journal de Chimie* in 1977. It is therefore highly appropriate that he be honoured with a themed issue in the journal. We extend to him our very best wishes for continued successful science, and we are sure that he will continue to be recognised. His homepage, <http://astruc.didier.free.fr>, will continue to keep everybody up to date.

A stellar assembly of Didier's former students, postdocs, colleagues and friends from around the world (14 countries and over 70 laboratories) have contributed to this *NJC* issue in celebration of the outstanding significance of his ongoing contributions to chemistry, covering a very broad range of scientific domains. Yves Chauvin (2005 Nobel Laureate) will present a copy of this themed *NJC* issue to Didier during a symposium in his honour to be held at the University Bordeaux 1 on December 1–2, 2011, and which will include Grand Public

lectures by Henri Kagan and Jean-Pierre Sauvage, and a Grand Public discussion with Yves Chauvin.

As the guest editors of this *NJC* themed issue, we would like to express our gratitude to all the authors who replied to our invitations and contributed to this themed issue, as well as to the reviewers for their help with the evaluation of the submitted manuscripts. We also thank Dr Denise Parent, *NJC* Managing Editor, and the Editorial staff of *NJC* and RSC Publishing for their great effort and help in its realisation.

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**Jean-René Hamon and
Jean-Yves Saillard**

(SCR, UMR CNRS 6226 Université de
Rennes 1, France)

Jaime Ruiz

(ISM, UMR CNRS 5255 Université
Bordeaux 1, France)

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