Journal of Organometallic Chemistry 891 (2019) 86–87

Contents lists available at ScienceDirect

Journal of Organometallic Chemistry

journal homepage: www.elsevier.com/locate/jorganchem

Biosketch – Professor Armando J. L. Pombeiro: "Synthesis and Applications of Organometallic Compounds"

Professor Armando J. L. Pombeiro

This Special Issue of *Journal of Organometallic Chemistry* is dedicated to Professor Armando J. L. Pombeiro, who has worked in many areas of Coordination Chemistry, including Organometallic Chemistry and Catalysis for over 45 years.

Armando Pombeiro was born in 1949 in Porto, a city in the North of Portugal. He received his PhD degree in 1976 at the University of Sussex, England, under the supervision of Prof. J. Chatt and Dr. R. L. Richards. He was appointed as Assistant (1971), Auxiliary Professor (1976), Associate Professor (1979) and Full Professor (1989) at the Instituto Superior Técnico (IST), then at the Universidade Técnica de Lisboa (now Universidade de Lisboa).

A main feature of Pombeiro's scientific research, which is evident from the following description, concerns his contribution to the promotion of interdisciplinarity and transdisciplinarity in Chemistry, establishing new links within various fields of Chemistry and their interactions with related sciences.

Pombeiro started his research career in the overall field of nitrogen fixation, studying the coordination chemistry of isocyanides (isoelectronic with dinitrogen) at "electron-rich" dinitrogen-binding metal sites. He found a novel route to form metal-carbon multiple bonds by using electrophilic attack on isocyanides that led to the formation of aminocarbyne ligands. He then introduced his country to the field of the activation of small molecules by metal centres, by broadening his research interests to the activation, upon coordination, of a range of substrates with biological, industrial or environmental interest and related ones (*e.g.*, nitriles, cyanamides, nitric oxide, isocyanides, carbon dioxide, carbon monoxide, alkynes, phosphaalkynes, oximes, olefins, alkanes, azides, cyanates, hydrazones, barbiturates or thiazoles) by transition metal centres, and developing their application in metal-mediated synthesis and catalysis, namely by searching for mimetic systems of biological processes (*e.g.* catalysed by peroxidases, particulate methane monooxygenase, nitrile hydratases and nitrogenases), alternatives for industrial processes and new types of molecular activation. He established unprecedented routes to multiple metal-carbon (aminocarbynes, phosphidocarbenes), multiple metal-nitrogen (azavinylidenes) and metal-phosphorus (*e.g.*, phosphinidene oxide) bonds, upon activation of suitable unsaturated molecules by "electron-rich" phosphinic transition metal centres (of Re, Mo, W and Fe) towards electrophilic attack.

In the field of Catalysis, Pombeiro's group has synthesized a wide diversity of new mono-, di- and multinuclear homo- and heterometallic molecular catalysts with metals along the Periodic Table, often bearing N–, O– and/or P-ligands (such as hydrosoluble C-scorpionates, amino-polyalcohols, benzene-polycarboxylates, N-hydroxyiminodicarboxylates, arylhydrazones of active methylene compounds, azine-fragment ligands, triazaphosphaadamantane and derivatives, etc.), and applied them in different types of catalytic processes with industrial significance (*e.g.*, alkane functionalization; oxidation of other hydrocarbons, alcohols, ketones and water; C–C coupling reactions, hydrosilylation of alkynes, CO_2 coupling with epoxides to cyclic carbonates, transesterification, etc.) or as bioactive species. Not only new types of catalysts, but also novel routes and mechanisms have been established, for instance, to convert alkanes into functionalized products with an added value, such as carboxylic acids, in processes that are much simpler (single-pot) and proceed under more sustainable conditions than the industrial ones. Electrocatalysis was also an object of his interest (see below).

Another topic in Pombeiro's fields of interests concerns the design and synthesis of bio-active transition metal and organo-tin coordination/organometallic compounds, namely with anti-tumor or anti-bacterial activity, and identification of biological targets in the cells.

Electrochemistry is yet another important direction of Pombeiro's research. He was the main founder of the Portuguese Electrochemical Society (1983) and of its journal, *Portugaliae Electrochimica Acta*. In the early 90s he initiated a series of international conferences on Molecular Electrochemistry of coordination compounds (a field he pioneered in his country) and edited a number of books on this topic (see below). One important aspect of his work in this area was the use of redox potentials of coordination/organometallic compounds to assess the electron acceptor/donor properties of the ligands. The electrochemical studies also addressed the activation of coordination/organometallic compounds by electron-transfer (ET), *e.g.*, ET-induced isomerizations of carbonyl and nitrile complexes, ET chain catalysis of CO complexes, and ET mediators in oxidation catalysis.

The magnitude of Prof. Pombeiro's contributions to the international scientific community is revealed by the number of his scientific publications (*ca.* 800) which include numerous reviews and

https://doi.org/10.1016/j.jorganchem.2019.04.005
0022-328X/

book chapters. His publications were cited over 20,000 times, h-index = 63 (Web of Science). He also holds 40 patents and has delivered more than 110 invited (plenary, keynote and session) lectures at international conferences, apart from many other invited lectures at foreign universities and research centres.

He has authored one book and edited several more including: *i*) "Alkane Functionalization", Wiley, 2019; *ii*) "Noncovalent Interactions in Catalysis", Royal Society of Chemistry, 2019; *iii*) "Noncovalent Interactions in the Synthesis and Design of New Compounds", Wiley, 2016; *iv*) "Advances in Organometallic Chemistry and Catalysis", Wiley, 2014; *v*) "Trends in Molecular Electrochemistry", Marcel Dekker/Fontis Media, New York/Lausanne, 2004; *vi*) "Molecular Electrochemistry of Inorganic, Bioinorganic and Organometallic Compounds", Kluwer Academic Publishers, Dordrecht, The Netherlands, 1993.

Prof. Pombeiro is/was a Guest-Editor of several journal special issues, namely on "Metal Systems for Sustainable Chemistry" and another one (*Inorg. Chim. Acta*) to celebrate the career of Prof. Fraústo da Silva, with whom he initiated his own career as Assistant at the IST (1971). The special issue on "Catalysis in Portugal" (*ChemCatChem*) and a few others in various journals are currently ongoing.

Pombeiro's impact on the scientific community is also attested by the number of advanced degrees received by the students he supervised, Master (20) and PhD (27), and the postdoctoral researchers (over 55) that he mentored and continues to support. The students have come from many countries because his research interests have such a broad international appeal. The training in his Laboratory has prepared them for scientific careers in a variety of directions with some of them achieving top positions in the academic or industrial sectors in various countries around the world. He strongly emphasizes originality and scientific independence in his Group, and has a high capacity to promote collaborations not only within his group, but also towards building links with external groups, often abroad.

Pombeiro is also recognized by a variety of honorary and official appointments and memberships. He is former President of the research unit Centro de Química Estrutural at IST and is Coordinator of its Coordination Chemistry and Catalysis group, President of the recently founded College of Chemistry of the Universidade de Lisboa (the Installation Commission of which was also coordinated by him), Director of the Catalysis and Sustainability (CATSUS) PhD program (he also coordinated the proposal for its creation), Full Member of the Academy of Sciences of Lisbon (where he was in charge of directive positions, as General-Secretary and Vice President of the Class of Sciences), Fellow of the European Academy of Sciences, and former President (currently Vice-President) of the Portuguese Electrochemical Society, etc., etc.

In recognition of his (seminal) scientific contributions, Pombeiro has received various prizes and honors, awarded by the French Chemical Society (the SCF French-Portuguese Award, attributed recently for the first time, 2018), by the Spanish Royal Chemical Society (the Madinabeitia-Lourenço Prize), by the Portuguese Chemical and Electrochemical Societies, by the Universidade Técnica de Lisboa, by the Universidade de Lisboa, by the Foundation for Science and Technology (Portugal) and by the international vanadium scientific community (*Vanadis* award).

Pombeiro and his group have been very active in the organization of conferences. He is/was chairman/member of organizing/scientific committees of over 40 international conferences or schools. For instance, he chaired the XXV International Conference on Organometallic Chemistry (XXV ICOMC) held in Lisbon, 2012. He has been a member of many international conferences' advisory boards. Pombeiro will chair the 1st International Conference on Noncovalent Interactions (ICNI, Lisbon, 2019) and the XXII International Symposium on Homogeneous Catalysis (ISHC, Lisbon, 2020).

On the special occasion of Pombeiro's 70th birthday, his coworkers and friends are pleased to honour him with this Special Issue of *Journal of Organometallic Chemistry* on "Synthesis and Applications of Organometallic Compounds". Dear Armando, Happy Birthday to you! Many thanks for your contributions to organometallic, coordination and organic chemistry, as well as to catalysis and electrochemistry, and for your numerous publications in the Elsevier journals, including in the *Journal of Organometallic Chemistry*.

Georgiy B. Shul'pin, Guest Editor*
Semenov Institute of Chemical Physics, Moscow, Russian Academy of Sciences, Russia

Luísa M. Martins, Guest Editor**
Universidade de Lisboa, Portugal

Richard Adams, Editor-In-Chief
University of South Carolina, USA
E-mail address: AdamsRD@mailbox.sc.edu.

* Corresponding author.

** Corresponding author.
E-mail address: shulpin@chph.ras.ru (G.B. Shul'pin).
E-mail address: luisammartins@tecnico.ulisboa.pt (L.M. Martins).

Available online 10 April 2019