

## FRANCESCO DI GIACOMO

### EDUCATION

- Graduated in chemistry from the University of Florence in 1966 with 109/110 with a thesis in electrochemistry.
- Graduated in physics from the university of Rome La Sapienza in 1990 with 110/110 with a thesis in theoretical chemistry.

### PROFESSIONAL EXPERIENCE

- Volunteer assistant and CNR (Italian National Research Council) fellow from 1966 to 1969 at the institute of chemistry, faculty of Engineering, La Sapienza University of Rome.
- Assistant professor at the institute of chemistry, faculty of Engineering, La Sapienza University of Rome from 1970 to retirement in 2008. Since 1970 professor of the courses in Chemistry and Chemistry Exercises. From 2007 to 2009 - at the invitation of Prof. Maurizio Cumo - professor on Combustion Chemistry for students of Energy Engineering.
- CNR foreign scholar from 1974 to 1976 to prof. Rudolph A. Marcus at the university of Illinois at Urbana-Champaign.
- Fellow of the Academy of Sciences of the German Democratic Republic and the NRC as Mitarbeiter of Professor Lutz Zülicke for the first three months of 1988.

### RESEARCH ACTIVITIES, LIST OF PUBLICATIONS.

1. F. Di Giacomo, F. Rallo e L. Rampazzo: "Comportamento polarografico del fenilfluorone. Nota II: Riduzione in Dimetilsolfossido", *La Ricerca Scientifica*, 37, 1086-1091 (1967).
2. F. Rallo, L. Rampazzo e F. Di Giacomo: "Riduzione polarografica dell'ossido d'azoto in dimetilsolfossido", *La Ricerca Scientifica* 38, 1085-1089 (1968).
3. F. Di Giacomo e F. Rallo: "Riduzione polarografica dell'ossido d'azoto in dimetilsolfossido in assenza ed in presenza di agenti protonanti", *Gazzetta Chimica Italiana*, 101, 5081-5090(1971).
4. Francesco F. Di Giacomo: "A Semiempirical Potential Energy Surface for Chemiluminescent Electron Transfer Reactions I", *Z. Physik. Chem. N. F.* 122, 1-13 (1980).
5. M.G. Bonicelli, M.E. Cardinali, I. Carelli, G. Ceccaroni and F. Di Giacomo: "On the Electrochemical Behaviour of 2-Furaldoxine in Aqueous Buffered Medium", *Annali di Chimica*, 453-459 (1981).
6. M.G. Bonicelli, M.E. Cardinali, I. Carelli and F. Di Giacomo: "A New Derivation of the Approximate Phase Change Formula  $\Delta T = Km$ "; *J. Chem. Ed.* 61, 423-424 (1984).
7. F. Schneider, L. Zülicke, F. Di Giacomo, F.A. Gianturco, I. Paidarovà and R. Polàk: "DIM Model Calculations for  $(O_2H^+)$  Interaction Potentials", *Chem. Phys.* 128, 311-320 (1988).
8. F. Di Giacomo, F.A. Gianturco and F. Raganelli, F. Schneider: "On some structural properties of various electronic states of the hydroxoniumion" *J. Chem. Phys.* 101, 3952-3961 (1994).

9. F.A. Gianturco and F. Schneider, F. Di Giacomo: "Selective Vibrational Excitations in Proton-Water Collisions: a Study Based on CI Calculations", J. Phys. Chem. 99, 64-75 (1995).
10. F.A. Gianturco and F. Schneider, F. Di Giacomo: "The Linear Symmetric States of Water and its Cation", Gazzetta Chimica Italiana, 125, 361-372 (1995).
11. F. Schneider, F. Di Giacomo and F.A. Gianturco: "The lower  $C_{2v}$  potential energy surfaces of the singlet states of  $H_2O$ : a computational study", J. Chem. Phys. 104, 5153-5164 (1996).
12. F. Schneider, F. Di Giacomo and F.A. Gianturco: "The lower  $C_{2v}$  potential energy surfaces of the doublet states of  $H_2O^+$ : a computational study", J. Chem. Phys. 105, 7560-7568 (1996).
13. F. Di Giacomo, F.A. Gianturco, E.E. Nikitin, F. Schneider: "Proton-Water Charge Transfer Processes: Follow-up Study Using Configuration Interaction Calculations", J. Phys. Chem. A 103, 7116-7126 (1999).
14. F. Di Giacomo, F. Schneider, E.E. Nikitin: "Conical intersections between three lowest adiabatic potential energy surfaces of the oxonium ion", Chem. Phys. Lett. 373, 258-265 (2003).
15. Francesco Di Giacomo, E.E. Nikitin: "On the Majorana formula and the Landau-Zener-Stueckelberg treatment of the avoided crossing problem", Physics-Uspekhi, 48 (5) 515-517 (2005).
16. Francesco Di Giacomo: "A Short Account of RRKM Theory of Unimolecular Reactions and of Marcus Theory of Electron Transfer in a Historical Perspective", Journal of Chemical Education 92 (3), 476-481 (2015).
17. Francesco Di Giacomo: "On Some Characteristics of Marcus' Work in the Light of the History of Science", Foundations of Chemistry 17, 67-78 (2015).
18. Francesco Di Giacomo: "Early theoretical chemistry: Plato's chemistry in Timaeus", Foundations of Chemistry 23(1) (2020).
19. Francesco Di Giacomo: "On some analogies of modern Science with Plato's science in Timaeus and on Plato's influence on Kepler and Ptolemy", Indian Journal of History of Science (2022) 57:16-25.
20. Francesco Di Giacomo, "Ancient Analogues of Chemical Equations", Bull.Hist.Chem, Volume 47, Number 3 (2022), p.265.
21. Francesco Di Giacomo, "On how some fundamental chemical concepts are correlated by arithmetic, geometric and harmonic Means", Foundations of Chemistry 25, 265-268 (2023).

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#### PUBLISHED BOOKS

1. Introduction to Marcus Theory of Electron Transfer Reactions. Published in 2020 by World Scientific, 872 pages. <https://doi.org/10.1142/11503>
  2. Interviews with Rudolph A. Marcus on Electron Transfer Reactions. <https://doi.org/10.1142/11753> Published in 2020 by World Scientific, 802 pages.
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## ABOUT THE PUBLISHED BOOKS

The book *Introduction to Marcus Theory of Electron Transfer Reactions* has a forward from the Nobel Prize in Chemistry in 1992 Prof. Rudolph Arthur Marcus:

*The author of this volume, Professor Francesco Di Giacomo, a member of the engineering faculty of the University of Rome, was also, some 40+ years ago, a visitor in my group, at that time at the University of Illinois. More recently he set himself the daunting task of learning about the theory of electron transfer reactions, with a background that included some research on the quantum mechanics of potential energy surfaces but none on key aspects of electron transfer theory - the dynamical features of quantum and classical theory, the statistical mechanics of chemical reactions, and features such as non-equilibrium dielectric polarization. They form the core of the theory and its applications. To this end he supplemented his study of my electron transfer articles by many hour-long question and answer sessions that we held, largely via Skype. Francesco comes with a delightful background rich in cultural and scientific history, especially of the ancient Greek and Roman periods. It added another side to our many discussions, an aspect that does not come out in this book but is seen in articles he has published elsewhere. Our discussions on the electron transfer articles involved many fine points of the theory and of its history, points that are described in this book. With his background Professor Di Giacomo's scientific questions have a fresh and novel point of view that was both interesting and challenging. It adds to the novelty of the book. Hopefully the readers will find it equally so, in their study of the theory, of its history and in exploring the many distinct concepts that electron transfer processes present.*

## OPINION ON THE BOOKS

1. *These books are wonderful contributions to the world of science.*

*Marshall Newton, Senior Researcher Brookhaven National Laboratories, Upton, New York.*

2. *These books are a delight.*

*Rober J. Cave, Professor of Chemistry, Harvey Mudd College, Claremont California.*

3. *This is fantastic! We need such books.*

*Alexei Stuchebruchov, Professor of Chemistry, University of California Davis.*

4. *I shall take care to order this valuable literature source to the Tartu University.*

*Arvi Freiberg, Professor of Biophysics and Plant Physiology, University of Tartu.*

5. *Many thanks for bringing this exciting book to my attention.*

*Robert Forster, Professor of Physical Chemistry, Dublin City University.*

6. *It looks like a very interesting book.*

*Johan Hjelm, Professor of chemistry, Technical university of Denmark.*

7. *These books seem really interesting.*

*Eric Vauthey, Professor of Chemistry, University of Geneva.*

8. *That sounds very interesting. It seems like a tremendous effort on your side - congratulations!*

*Leif Hammarstrom, Professor of Physical Chemistry, University of Uppsala.*

9. *Your two new books look like a very useful and timely contributions. I am sure that the entire community will be grateful for your efforts.*

*Raphael Levine, Max Born Professor of Natural Philosophy, The Hebrew University of Jerusalem, Wolf Prize for Chemistry 1988.*

10. *It looks very thorough and useful for teaching.*

*Spiros Skourtis, Associate Professor of Physics, University of Cyprus.*

11. *It looks a very interesting book, congratulations.*

*Noam Agmon, Professor of Chemistry, The Hebrew University of Jerusalem.*

12. *Thank you for forwarding your interesting book.*

*Jun Huang, Researcher, Universität Ulm.*

13. *E' un testo eccellente, la ringrazio per aver fatto l'enorme fatica di scriverlo.*

*Sergio Brutti, Professor of Chemistry, Sapienza University of Rome*

14. *Thank you Francesco Di Giacomo for this incredible book. I cannot imagine the number of hours to obtain the present masterpiece.*

*Olivier Fontaine, junior member of Institut universitaire de France, Professor of Chemistry, University of Montpellier.*

15. *Dear Francesco, Thanks for letting me know about your books, which I have just ordered and look forward to reading. I am teaching my graduate class on Electrochemical Energy Systems with a few lectures on electron transfer, so my students will also find the book useful. I had the pleasure of meeting Rudy Marcus myself a few years ago at Caltech, and we discussed my recent work on coupled ion electron transfer and applications of Marcus theory in batteries and others areas of engineering. I attach some key papers in case you are interested. I nearly finished with several comprehensive studies validating CIET predictions for a wide range of Li-ion battery interfaces using pulsed voltammetry (with Yang Shao-Horn) and direct inversion of x-ray image data (with Will Chueh), so I expect Marcus theory to gain even more attention in this field in the coming years. Best regards, Martin*

*Martin Z. Bazant, E. G. Roos (1944) Professor, Chemical Engineering & Mathematics, Massachusetts Institute of Technology*

16. *Caro Francesco, (penso possiamo darci del tu, siamo colleghi, seppure di età, penso, notevolmente diversa). Complimenti per questa tua opera nel campo dell'electron transfer, argomento che mi ha affascinato per molti anni, forse, soprattutto, per la sua importanza nelle reazioni fotochimiche, lo non sono un teorico, e spesso ho faticato a capire le parti quanto meccaniche della teoria di Marcus. Ricordo con piacere di aver incontrato Marcus per la prima volta a Capri nel 1987, quando accettò il mio invito di partecipare al primo congresso sulla fotochimica supramolecolare. Ultimamente mi sono dedicato con passione ai problemi della crisi energetica e climatica, facendo opera di divulgazione e anche tentativi di convincimento su politici di vario livello, con scarse risposte.*

*Divulgherò per quanto possibile i tuoi libri. Con stima e affetto, Vincenzo Balzani, Professore di Chimica Fisica, Università di Bologna*

17. *Thanks a lot for your suggestions. Congrats for these two great books!, Miquel Solà i Puig, Professor of Chemistry, University of Girona*

18. *Caro Prof. Di Giacomo, grazie mille per l'email e congratulazioni per i due volumi. Assieme al mio assegnista Dr. Marco Lagnoni (in CC) li prenderemo in considerazione.*

*Saluti,*

*Antonio, Antonio Bertei, Professore Associato di Chimica, Università di Pisa*

19. *Steve Zaubitzer*

*5.0 out of 5 stars Reviewed in Germany on 21 October 2021*

*Verified Purchase*

*The present textbook gives a detailed and very nice overview about the theory of electron transfer. In the process, the theory is underpinned with sophisticated formulas and is definitely only more than an introduction.*

*Review Amazon.de.*

20. *Two very interesting books.*

*John G. Kirkwood and Arthur A. Noyes Professor of Chemistry*

*California Institute of Technology*

*Nobel Prize for Chemistry 1992*

*“Despite dating back to the 1950s, the formalisation of redox dynamics remains a complex and challenging topic. However, Professor Francesco, using the historical analytical approach, brilliantly captures the essence and genius of Nobel laureate R. Marcus’s seminal work, providing a unified and accessible understanding of this fascinating and rapidly evolving field. This work is a true masterpiece and an absolute must-read for anyone interested in this important area of study. Get ready to be blown away!”*

*Prof Olivier FONTAINE*

*Director of Molecular Electrochemistry for*

*Energy laboratory, Vistec Member of Institut Universitaire de France*

*“...(this book brings together) Professor Marcus’ personal recollections and insights into the pioneering theory that he and co-workers developed... Significantly, the interviews reveal subtle details of language and interpretation of the original papers that help tremendously in understanding the intricacies and differences between systems as diverse as photosynthetic bacteria to electron transfer across liquid-liquid Interfaces that are not easily appreciated in the original publications. It is equally fascinating to get insights into the process involved in formulating the key aspects that a new theory must address even before the mathematical descriptions arise!”*

*Prof Robert Forster, Dublin City University*