

Professor Nicolò Vivona

A Tribute



Nicolò Vivona was born in Calatafimi, in the province of Trapani (Italy), on December 9, 1939, near the ancient Greek site Segesta. After graduating from a classical studies high school, he obtained his degree in Chemistry *cum laude* from the University of Palermo in 1963. In 1965, he started his academic career as a voluntary assistant for the Organic Chemistry course. In 1973, he became Assistant Professor of Organic Chemistry and, after being tenured in 1977, he became Full Professor of Organic Chemistry in 1980. He was appointed as Chair of Organic Chemistry for the Major in Biological Sciences and of Organic Chemistry II for the Major in Chemistry of the Faculty of Science. He was Head of the Department of Organic Chemistry between 1987 and 1990, and is presently a member of the Council for the coordination of Ph.D courses in Chemical Sciences. His scientific production started in 1965 with research on imidazolones and, since then, his research has been entirely devoted to the chemistry of five-membered heterocyclic compounds as documented by more than one hundred papers in international scientific journals such as *Chem. Comm.*, *J. Org. Chem.*, *Tetrahedron* and *Tetrahedron Lett.*, *J. Heterocyclic Chem.*, *Heterocycles*, *J. Chem. Soc. Perkin Trans 1* and *2*, *Synthesis* etc. In the early 1970's, he was among the investigators of the now well-known Boulton-Katritzky rearrangements in the azole series. While always focusing on heterocyclic rearrangements, his research has constantly been updated following current trends in organic chemistry. For instance, in 1988 he enriched his

research with the use of photochemical methodologies, in collaboration with Professor T. Caronna (University of Milan), and published a series of articles on the photoreactivity of heterocyclic systems. This continues to be an active topic on which he continues to publish. In 1999, beginning a collaborative project with Professor Gambaretto (University of Padua) and Professor Resnati (University of Milan) he became interested in the synthesis and the reactivity of fluorinated heterocycles, some of which are currently being developed as new materials (Ionic Liquids, ILs, Ionic Liquid Crystals, ILCs, Starburst Molecules, etc.) for optoelectronic applications. In 2005, he published a paper on the first photo-induced rearrangement of a five-membered heterocycle in zeolite. More recently, in collaboration with Professor E.L. Clennan (University of Wyoming), he published an article on the application of zeolites, modified with fluorinated heterocyclic salts, for singlet oxygen photooxidations. Presently, he is collaborating with computational chemists to unravel complicated mechanistic aspects of some photo-induced and thermal rearrangements of azoles.

Devoted father to Letizia and Nicoletta and lovingly supported by his wife Emiliana, Nicolò Vivona is a prominent guide for both his actual and his scientific families. Seemingly introverted, but actually meditative, he expresses his passion for science with facts more than words. First to arrive and last to leave his lab, he truly represents the spirit of the researcher by instilling curiosity in the younger chemists and discussing science with his colleagues while sharing a brain-boosting shot of espresso. Open minded to the new trends in heterocyclic and organic chemistry, he is an advocate of a thorough and accurate bibliography. He often flavors his discussions with quotes from Roman and Italian literature, Greek philosophers, proverbs and maxims, reflecting his classical studies background. Overall, Nicolò Vivona is a resourceful person—a hidden treasure of precious suggestions for keeping in stride with chemistry, science and life.

Selected Publications

1. Ruccia, M.; Vivona, N. Ricerche sugli Imidazoloni. *Atti Accad. Scienze Lettere Arti in Palermo* [4] **1965**, 24, 265.
2. Ruccia, M.; Vivona, N. Trasformazione di derivati dell'1,2,4-Ossadiazolo in derivati dell'1,2,3,2H-Triazolo, Nota II. *Ann. Chim. (Roma)* **1967**, 57, 680.
3. Ruccia, M.; Vivona, N. A New Rearrangement in the 1,2,4-Oxadiazole Series. *Chem. Commun.* **1970**, 866.
4. Vivona, N.; Cusmano, G.; Ruccia, M.; Spinelli, D. Mononuclear Isoheterocyclic Rearrangements. Note I. Interconversion of 3-Benzoylamino-5-methyl-1,2,4-Oxadiazole and 3-Acetylamino-5-methyl-1,2,4-Oxadiazole. *J. Heterocycl. Chem.* **1975**, 12, 985.
5. Ruccia, M.; Vivona, N.; Spinelli, D. Mononuclear Heterocyclic Rearrangements. *Adv. Heterocycl. Chem.* **1981**, 29, 141.

6. Buscemi, S.; Cicero, M.G.; Vivona, N.; Caronna, T. Photochemical Behaviour of some 1,2,4-Oxadiazole Derivatives. *J. Chem. Soc., Perkin Trans. 1* **1988**, 1313.
7. Vivona, N.; Buscemi, S.; Frenna, V.; Cusmano, G. Ring-Transformations of Five-Membered Heterocycles. *Adv. Heterocycl. Chem.* **1993**, *56*, 49.
8. Buscemi, S.; Vivona, N.; Caronna, T. Photoinduced Molecular Rearrangements. Some Investigations of the Photochemical Behavior of 3-Acylamino-1,2,5-oxadiazoles (Furazans). *J. Org. Chem.* **1995**, *60*, 4096.
9. Vivona, N.; Buscemi, S. Photoinduced Molecular Rearrangements of O-N Bond-Containing Five-Membered Heterocycles. An Assay for 1,2,4-and 1,2,5-Oxadiazoles. *Heterocycles* **1995**, *41*, 2095.
10. Pace, A.; Buscemi, S.; Vivona, N.; Caronna, T. Sensitized Photoreduction of Nitrosoazoles on Titanium Dioxide. *Heterocycles* **2000**, *53*, 183.
11. Buscemi, S.; Pace, A.; Vivona, N. Fluoro Heterocycles. A Photochemical Methodology for the Synthesis of 3-Amino- and 3-(N-alkylamino)-5-perfluoroalkyl-1,2,4-oxadiazoles. *Tetrahedron Lett.* **2000**, *41*, 7977.
12. Buscemi, S.; Rosselli, S.; Bruno, M.; Vivona, N.; Piozzi, F. Photoinduced functionalization of C-20 methyl group of the Nor-diterpene Atractyligenin. *Tetrahedron Lett.* **2001**, *42*, 8289.
13. Buscemi, S.; Pace, A.; Pibiri, I.; Vivona, N. Competing Ring-Photoisomerization Pathways in the 1,2,4-Oxadiazole Series. An Unprecedented Ring-Degenerate Photoisomerization. *J. Org. Chem.* **2002**, *67*, 6253.
14. Buscemi, S.; Pace, A.; Pibiri, I.; Vivona, N.; Spinelli, D. Fluorinated Heterocyclic Compounds. An Expedient Route to 5-Perfluoroalkyl-1,2,4-triazoles via an Unusual Hydrazinolysis of 5-Perfluoroalkyl-1,2,4-oxadiazoles: First Examples of an ANRORC-like Reaction in the 1,2,4-Oxadiazole Derivatives. *J. Org. Chem.* **2003**, *68*, 605.
15. Buscemi, S.; Pace, A.; Pibiri, I.; Vivona, N. Tullio Caronna. Fluorinated Heterocyclic Compounds. An Assay on the Photochemistry of Some Fluorinated 1-Oxa-2-azoles: An Expedient Route to Fluorinated Heterocycles. *J. Fluorine Chem.* **2004**, *125*, 165.
16. Pace, A.; Buscemi, S.; Vivona, N. Heterocyclic Rearrangements in Constrained Media. A Zeolite-Directed Photorearrangement of 1,2,4-Oxadiazoles. *J. Org. Chem.* **2005**, *70*, 2322.
17. Pace, A.; Buscemi, S.; Vivona, N. The Synthesis of Heteroaromatic Compounds. Part 1. Five-membered Rings with More than two Heteroatoms. A Review. *Org. Prep. Proc. Int.* **2005**, *37*, 447.
18. Pibiri, I.; Pace, A.; Buscemi, S.; Vivona, N.; Malpezzi, L. Designing fluorous domains. Synthesis of a series of pyridinium salts bearing a perfluoroalkylated azole moiety. *Heterocycles* **2006**, *68*, 307.
19. Buscemi, S.; Pace, A.; Piccionello, A. P.; Vivona, N. Synthesis of fluorinated first generation starburst molecules containing a triethanolamine core and 1,2,4-oxadiazoles. *J. Fluorine Chem.* **2006**, *127*, 1601.

20. Pace, A.; Buscemi, S.; Vivona, N.; Silvestri, A.; Barone, G. Photochemistry of 1,2,4-oxadiazoles. A DFT study on photoinduced competitive rearrangements of 3-amino- and 3-N-methylamino-5-perfluoroalkyl-1,2,4-oxadiazoles. *J. Org. Chem.* **2006**, *71*, 2740.
21. Pace, A.; Buscemi, S.; Vivona, N. The synthesis of fluorinated heteroaromatic compounds. Part 2. Five-membered rings with two heteroatoms. A review. *Org. Prep. Proc. Int.* **2007**, *39*, 1.
22. Celso, F. Lo; Pibiri, I.; Triolo, A.; Triolo, R.; Pace, A.; Buscemi, S.; Vivona, N. Study on the thermotropic properties of highly fluorinated 1,2,4-oxadiazolyl-pyridinium salts and their perspective applications as ionic liquid crystals. *J. Mater. Chem.* **2007**, *17*, 1201.
23. Pace, A.; Pierro, P.; Buscemi, S.; Vivona, N.; Clennan, E.L. Photooxidations of alkenes in fluorinated constrained media: Fluoro-organically modified NaY as improved reactors for singlet oxygen “ene” reactions. *J. Org. Chem.* **2007**, *72*, 2644.
24. Pace, A.; Pibiri, I.; Piccionello, A. P.; Buscemi, S.; Vivona, N.; Barone, G.; Experimental and DFT Studies on Competitive Heterocyclic Rearrangements. Part 2: A One-Atom Side-Chain versus the Classic Three-Atom Side-Chain (Boulton-Katritzky) Ring Rearrangement of 3-Acylamino-1,2,4-oxadiazoles. *J. Org. Chem.* **2007**, *72*, 7656.