

Carlo F. Morelli

Assistant Professor

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Assistant Professor, SSD CHIM/06 - Organic Chemistry

Curriculum vitae

Carlo Francesco Morelli graduated cum laude in Chemistry and Pharmaceutical Technology at the University of Ferrara in 1992 with a thesis in Organic Chemistry focused onto the generation and cycloaddition reaction of 1-nitro-1,3-dienes applied to the synthesis of the steroidal nucleus under the supervision of Prof. G. Pollini and Dr. V. Zanirato. After the fulfillment of military obligations in the period 1993-94, he received his PhD in Pharmaceutical Sciences, sub-area of Organic Chemistry, in 1998 (Tutor: Prof. A. C. Veronese). During the PhD, his research was focused onto the metal-catalyzed formation of carbon-carbon bonds between nitriles and β -dicarbonyl compounds, affording intermediates for the synthesis of heterocycles. Application of the method to ribose-derived β -ketoesters allowed a new entry to pyrazole and pyrimidine C-nucleoside derivatives. After a short period at the University of Ferrara, during which he was involved in the synthesis of technetium-based radiodiagnostics under the guidance of Prof. P. G. Baraldi, he moved to the Department of Organic and Industrial Chemistry at University of Milan, joining the group of Prof. Manitto and Prof. Speranza. Since then, his interests spanned the fields of organic natural compounds and bioorganic chemistry. Since December 2002 he is assistant professor at the now Department of Chemistry at the same University.

Research activity

Research activities of Dr. Morelli focus on bio-organic and natural product chemistry. A research topic concerns isolation of *umami* or *kokumi* compounds from plant sources and their synthesis through chemical or enzymatic methods. The enzymatic approaches are based on the study and the exploitation of γ -glutamyltransferases of microbial origin considered safe for food applications. Other enzymes currently under investigations are involved in the degradation of poly(γ -glutamic) acid (PGA), a natural polymer of industrial interest. The natural product research topic deals with isolation, structure elucidation and chemical modification of secondary metabolites from plants used in traditional medicine in various countries. Dr. Morelli collaborates in researches aimed at the chemoenzymatic synthesis of nucleosides and at the design and synthesis of compounds involved in the chemoreception of taste.

Founded research projects

Dr. Morelli has been recently involved as researcher in the following founded projects:

VaTub 2010 (R&D program, Regione Lombardia): Approccio biotecnologico alla produzione razionale di vaccini: nuovo vaccino anti-TBC;

VeLiCa 2011 (R&D Program, Regione Lombardia): From ancient crops materials and products for the future;

FavorDeNonDe 2013 (International call Core Organic Plus): Drying, juices and jams of organic fruit and vegetables: what happens to desired and non-desired compounds?

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RiceRes 2014 (Cariplo Foundation call "Integrated Research on Industrial Biotechnology"): From waste to resources: an integrated valorization of the rice productive chain residues.

Teaching

"Bioorganic Chemistry" for Master degree in Chemical Sciences and the Teaching Unit "Biocatalysis and Biotransformations" in the Course "Biotechnological Processes and Products" for Master degree in Molecular Biotechnology and Bioinformatics at the University of Milan.

Carlo Morelli was tutor or co-tutor of several Thesis for Bachelor degree in Chemistry, Master degree in Chemical Sciences and Master degree in Molecular Biotechnology and Bioinformatics.

Recent publications (2012-June 2015)

Morelli, C. F., Biagiotti, M., Pappalardo, V. M., Rabuffetti, M., and Speranza, G. Chemistry of α -mangostin. Studies on the semisynthesis of minor xanthenes from *Garcinia mangostana*. Nat. Prod. Res., 29, 750-755, 2015.

Kaewmanee, T., Bagnasco, L., Benjakul, S., Lanteri, S., Morelli, C. F., Speranza, G., and Cosulich, M. E. Characterisation of mucilages extracted from seven Italian cultivars of flax. Food Chemistry, 148, 60-69, 2014.

Bavaro, T., Filice, M., Temporini, C., Tengattini, S., Serra, I., Morelli, C. F., Massolini, G., and Terreni, M. Chemoenzymatic synthesis of neoglycoproteins driven by the assessment of protein surface reactivity. RSC Adv., 4, 56455-56465, 2014.

Calleri, E., Ubiali, D., Serra, I., Temporini, C., Cattaneo, G., Speranza, G., Morelli, C. F., and Massolini, G. Immobilized purine nucleoside phosphorylase from *Aeromonas hydrophila* as an on-line enzyme reactor for biocatalytic applications. J. Chromatogr. B: Anal. Technol. Biomed. Life Sci., 968, 79-86, 2014.

Morelli, C. F., Calvio, C., Biagiotti, M., and Speranza, G. pH-Dependent hydrolase, glutaminase, transpeptidase and autotranspeptidase activities of *Bacillus subtilis* γ -glutamyltransferase. FEBS J., 281, 232-245, 2014.

Bavaro, T., Torres-Salas, P., Antonioli, N., Morelli, C. F., Speranza, G., and Terreni, M. Regioselective Deacetylation of Disaccharides via Immobilized *Aspergillus niger* Esterase(s)-catalyzed Hydrolysis in Aqueous and Non-aqueous Media. ChemCatChem, 5, 2925-2931, 2013.

Speranza, G., Bagnasco, L., Biagiotti, M., Cosulich, M. E., Francescato, P., Morelli, C. F., Pappalardo, V. M., Rabuffetti, M., and Ubiali, D. Taste-active components in foods: umami and kokumi compounds. Chim. Ind. (Milan, Italy), 95, 115-119, 2013.

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Ceccarelli, D., Ovidi, E., Triggiani, D., Morelli, C. F., Speranza, G., Taddei, A., and Tiezzi, A. Antiproliferative activity of *Aloe arborescens* leaf skin extracts tested on murine myeloma cells: cytological studies and chemical investigations. *Medicinal and Aromatic Plant Science and Biotechnology*, 6 (special issue 2), 31-36, 2012.

Morelli, C. F., Ubiali, D., Serra, I., Biagiotti, M., Borghese, G., Pappalardo, V. M., Albertini, A. M., and Speranza, G. Chemoenzymatic synthesis of nucleosides. *Chim. Ind. (Milan, Italy)*, 94, 108-111, 2012.

Ubiali, D., Serra, C. D., Serra, I., Morelli, C. F., Terreni, M., Albertini, A. M., Manitto, P., and Speranza, G. Production, Characterization and Synthetic Application of a Purine Nucleoside Phosphorylase from *Aeromonas hydrophila*. *Adv. Synth. Catal.*, 354, 96-104, 2012.

Abbate, S., Lebon, F., Longhi, G., Morelli, C. F., Ubiali, D., and Speranza, G. Vibrational and electronic circular dichroism spectroscopies and DFT calculations for the assignment of the absolute configuration of hydroxy-substituted 2-tetralols. *RSC Adv.*, 2, 10200-10208, 2012.

Speranza, G. and Morelli, C. F. γ -Glutamyl transpeptidase-catalyzed synthesis of naturally occurring flavor enhancers. *J. Mol. Catal. B: Enzym.*, 84, 65-71, 2012.