

Conférence



Lecture

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Chiral Iodanes in Asymmetric Oxygenative and Carbon-Carbon Bond-Forming Reactions

Pavillon Jeanne-Mance

2101, rue Jeanne-Mance, Salle **CB-R450**

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-2011-present: Full Professor, Université de Bordeaux, Talence, France
-2011-2015: Director of the Division “Synthesis and Bioactive Molecules”
-2003-2013: Group Leader at the European Institute of Chemistry and Biology
-1999-2006: Assistant Head of the Laboratoire de Chimie des Substances Végétales
-1999-2005: Associate Professor, Université de Bordeaux, Talence, France
-1997-1998: Assistant Professor, Texas Tech University, TX, USA
-1994-1997: Postdoctoral Associate, Penn State University, USA (Prof. Ken Feldman)
-1990-1994: Ph.D., University of Wisconsin-Madison, WI, USA (John Ralph)

Honors and Awards

2014: Distinguished Senior Member of the “Société Chimique de France”
2004-2009: Junior Member of the “Institut Universitaire de France”
2008: Groupe Polyphénols Scientific Prize
2006: Dr. and Mrs Henri Labbé Prize of the French Academy of Sciences
2006: Acros Prize of the French Chemical Society
2005: CNRS Young Researcher ATIP Award

The chemistry of hypervalent organoiodine compounds, also referred to as iodanes, has unarguably experienced an impressive development since the early 1990s, as evidenced by both the diversity of iodane reagents that are available today and the number of chemical transformations that these reagents can promote. The initial incitement to the development of λ^3 - and λ^5 -iodanes (i.e., III- and IIV-based compounds), which was mainly due to their useful oxidizing properties and capacity to replace toxic heavy-metal-based reagents in dehydrogenative and oxygenative reactions, has paved the way to the exploitation of iodanes in various metal-free reactions. Major current and competing research efforts focus on the design of chiral iodane structures for asymmetric synthesis and organoiodine-catalyzed versions thereof. The focal reaction of our own contributions to this field is the dearomatization of phenols, which constitutes a powerful tactic for the rapid construction of highly functionalized molecular architectures, and often an ultimate key transformation in the biogenesis of numerous natural products. In particular, ortho-quinonoid cyclohexadienones can be efficiently generated by iodane-mediated hydroxylative phenol dearomatization (HPD). Such a transformation initially relies on the electrophilic character of the hypervalent iodine center, but it conceptually imposes a subsequent reactivity switch to phenols from being nucleophiles to becoming electrophiles. This “phenolic umpolung” enables regioselective attack of nucleophiles at a substituted ortho-carbon center of appropriate starting phenols.[1] Our solutions for selecting the configuration of this carbon center by both substrate- and reagent-controlled iodane-mediated oxygenative phenol dearomatizations, the application of these methodologies in HPD/[4+2] cascade reactions for natural products synthesis, and the extension of the use of our chiral iodanes in asymmetric carbon-carbon bond-forming reactions on phenols and ketones will be presented.