**Grégory DURAND**

**Dr. Grégory Durand** has been holding an assistant professor position in organic and physical chemistry at the University of Avignon since 2003. He obtained his Ph.D. in Organic Chemistry in 2002 and his Habilitation Thesis in 2009, at the University of Avignon. In 2007 and 2009, he spent one semester at the Ohio State University as a visiting scientist. His research focuses mostly on the synthesis of amphiphilic compounds that can be used as carriers of nitrone antioxidants as well as chemical tools including detergent and polymers for handling and studying membrane proteins. He has supervised 8 PhD students, 15 post-docs and research engineers, and 15 master students, and his scientific production comprises 75 original papers, 5 patents, and 2 book chapters. He was an elected member of the scientific council (2008 - 2010) and head of the chemistry department (2012 - 2014) and he is currently a member of the University Board.

Grégory Durand is the team leader of the *Bio-organic synthesis and colloidal systems* laboratory where he has served as coordinator of two French–German ANR–DFG research projects on the development of fluorinated detergents (FLUOR, 2016–2020) and nanodisc-forming polymers (NanoBelt, 2020–2023). He is also involved in strong partnerships with private companies. Since April 2015, he has been the co-head of the joint laboratory Chem2staB ([www.chem2stab.org](http://www.chem2stab.org)) with the company CALIXAR. Several detergents from the laboratory are now commercially available and are distributed worldwide through a network of distributors (Cayman, G-biosciences …). He was also involved in the development and the commercialization of non-ionic polymers (NAPols) with the company ANATRACE (USA)*.*

**Membrane-mimicking systems: Synthesis and applications**

**Abstract**

The first part of my presentation will be dedicated to the presentation of synthetic antioxidants that can been used either as therapeutics or probes in oxidative stress state. Indeed, there has been an increasing number of synthetic compounds reported in the literature over the past decades [1]. Among them, free radical scavengers such as α-phenyl-*N*-*tert*-butylnitrone (PBN) have been widely used as a protective agent in several biological models [2,3]. Amphiphilic compounds possessing both hydrophilic and lipophilic groups are expected to exhibit improved bioavailability and membrane crossing ability while more lipophilic compounds are expected to insert and remain within the membranes. Our work over the past 20 years has been devoted to the design of amphiphilic and lipophilic nitrones. I will present the most significant results we have obtained in collaboration with various partners.

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**Figure 1.** (Left) Evaluation of the antioxidant properties of Bitailed PBN nitrones in biomimetic membranes; (Right) Chemical structure of Cholesterol-based additives for the stabilization of membrane proteins.

In a second part of my presentation, I will talk about the need of suited chemical tools to extract, solubilize and stabilize membrane proteins (MPs). So far, conventional detergents have often failed to reach all the specific requirements for MPs handling. In our group we have extensively work on the design of milder detergents. Predominantly, we focused our synthetic approach on sugar-based amphiphilic molecules. Among them, an extensive work has been done on the diglucose methyl polar head (DG) to generated non-ionic detergents. We associated it with a variety of hydrophobic part from fluorinated tails to hydrogenated moieties including aliphatic chains or cholesterol skeleton. [4-6] Very recent findings showed that two DG derivatives can directly assemble lipids and membrane proteins to form lipid-bilayer nanodiscs rather than mixed micelles [7]. We also demonstrated that the use of single glucose (Glu) polar head could lead to promising amphiphiles that can be used either as additives of crystallization [8].

**References**

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