



第2回 超越バイオメディカルDX研究拠点 エクセレントコアセミナー

日時：令和5年7月21日（金）15:00-17:00

開催場所：JAISTイノベーションプラザ2Fシェアードオー
プンイノベーションルーム（要予約：定員30名）

Biomimetic protein bioconjugates for biomaterials and artificial organelles design

講演者：**Prof. Sébastien Lecommandoux**

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We report here an overview on the design of Elastin Like Polypeptides (ELPs) based conjugates and their applications in nanomedicine, biomaterials and artificial cells. We pay special attention to their modification with saccharides [1], polysaccharides [2] and lipids [3], aiming at mimicking both the structure and functionality of glycoproteins and lipoproteins. We developed synthetic strategies for the design of glycosylated polypeptides and polysaccharide-polypeptide biohybrids with controlled placement of sugar functionality. The ability of these systems for different biomedical applications, from drug-delivery to inhibitor, will be presented [4]. In addition, the design of a new class of lipoproteins based on ELPs with unique thermo-responsive character will be proposed. These biosynthetic lipoproteins can self-assemble into lipopolymerosomes, with tunable membrane permeability, opening avenues in drug delivery and artificial cell design [3]. Finally, our most recent advances in the design of complex, compartmentalized and functional artificial cells will be presented. Such a system is a first step towards the challenge of structural cell mimicry and functionality, and could act in the future as an autonomous artificial cell capable of detecting and healing in situ any biological deregulation [5,6].

[1] LMM Bravo Anaya, R Petitdemange, M Rosselin, E Ibarboure, B Garbay, E Garanger, TJ Deming, S Lecommandoux. *Biomacromolecules* 22, 1, 76–85 (2021)

[2] M. Levêque, Y. Xiao, L. Durand, L. Masse, E. Garanger, S. Lecommandoux. *Biomaterials Science* 10, 6365-6376 (2022)

[3] V Ibrahimova, H Zhao, E Ibarboure, E Garanger, S Lecommandoux. *Angew. Chem. Int. Ed.* 60, 15036-15040 (2021)

[4] H. Duan, M. Donovan, F. Hernandez, C. Di Primo, E. Garanger, X. Schultze, S. Lecommandoux. *Angew. Chem. Int. Ed.* 132 (32), 13693-13698 (2020)

[5] H. Zhao, V. Ibrahimova, E. Garanger, S. Lecommandoux. *Angew. Chem. Int. Ed.* 132 (27), 11121-11129 (2020)

[6] H. Zhao, E. Ibarboure, V. Ibrahimova, Y. Xiao, E. Garanger, S. Lecommandoux. *Advanced Science* 2102508 (2021)

講演者略歴：

Sébastien Lecommandoux received his Ph.D. (1996) in Physical Chemistry from the University of Bordeaux. After a postdoctoral experience at the University of Illinois (UIUC, USA) in the group of Prof. Samuel I. Stupp, he started his academic career at the Laboratoire de Chimie des Polymères Organiques as Associate Professor in 1998 and was promoted to Full Professor at Bordeaux INP in 2005. He is currently Director of the Laboratoire de Chimie des Polymères Organiques (LCPO-CNRS) and is leading the group “Polymers Self-Assembly and Life Sciences”. His research interests include the design of bio-inspired polymers for biomaterials and pharmaceutical development, especially based on polypeptide, proteins and polysaccharide-based block copolymers self-assembly, the design of polymersomes for drug-delivery and theranostic, as well as biomimetic approaches toward design of synthetic viruses and artificial cells. He published over 200 publications in international journal, 6 book chapters and 12 patents (2 being licenced), with over 17000 citations (h-factor 64, Google Scholar). He is also co-director of the joint laboratory LCPO-L'OREAL and co-founder of Emissary Cosmetics. Sébastien Lecommandoux is recipient of the CNRS bronze medal (2004), Institut Universitaire de France Junior Chair (IUF 2007), Fellow of the Royal Society of Chemistry RSC (2017), Seqens Award of the French Academy of Science (2019), Member of the Academia Europaea (2020), XingDa Lectureship Award from Peking University (2021). He has been Editor-in-Chief of Biomacromolecules (ACS) since 2020 after serving as Associate Editor since 2013. He is also in the Editorial Advisory Board of several international journals, including Bioconjugate Chemistry (ACS), Polymer Chemistry (RSC) and Biomaterials Science (RSC).

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