

# Antimicrobial systems based on biomimetic apatites: from bone applications to nanomedicine

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## Abstract

Nanocrystalline nonstoichiometric apatites constitute the mineral part of our bones. IT is possible to master the synthesis of biomimetic apatites in the laboratory, so as to mimic the characteristics of bone apatite. This includes their high surface reactivity allowing one to incorporate biologically-active ions and/or associate many types of (bio)molecules and drugs to convey additional functionalities relevant to biomedical applications such as bone regeneration but also in other domains as in nanomedicine (e.g. dermatology), exploiting the high intrinsic biocompatibility of these compounds, that can be adequately formulated as colloidal particles is needed. In this talk, I will give an overview of such bio-inspired apatites and will focus on the possibility to adjoin antimicrobial properties, whether for bone repair applications or in dermatology. The possibility to design smart delivery apatite-based systems will also be discussed. This talk will provide the background for understanding the crucial differences between nanocrystalline apatites and well-crystallized hydroxyapatite, and will also show some novel approaches in using these bio-inspired compounds for antimicrobial activity.

## Biography

A special focus in Prof. C. Drouet's research is dedicated to the investigation of bio-inspired calcium phosphates and related compounds, in particular of biomimetic nanocrystalline apatites analogous to bone mineral, in view of innovative bio-medical applications (bone regeneration, cellular drug delivery, medical imaging...). This includes a physico-chemical but also a thermodynamic approach. One area of active research is in tailoring such bio-inspired biomaterials to convey additional "à la carte" functionalities for use in oncology, hematology or dermatology, among other fields. Leader of the "Phosphates, Pharmacotechnics, Biomaterials" research group at CIRIMAT, University of Toulouse, France, C. Drouet regularly supervises Ph.D theses in (bio)materials sciences and is involved in the direction of undergraduate students and postdoctoral fellows, often international. He is the French coordinator of the French-German BioCapabili Engineering Cluster on innovative antimicrobial materials ([www.biocapabili.com](http://www.biocapabili.com)), and received the honorary *Racquel Lezeros Award* in June 2013 and the *ISCM Excellence Award* in 2016, for contribution to the field of calcium phosphate research.

