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# Mineral-organic interactions: toward innovative therapeutic devices for tomorrow's medicine

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*Mineral-organic interactions are of prime importance in a wealth of systems, whether in life sciences, including biomineralization processes, or else in composite and hybrid materials, Unveiling the underlying interaction mechanisms is then a key challenge for understanding how such systems may evolve or degrade in given conditions, and how they can be exploited for applicative purposes. Among mineral compounds of either natural or synthetic origins, calcium phosphates represent a major family of compounds. Calcium phosphate cements (CPC) have for example been extensively studied and exhibited various advantages such as biocompatibility, injectability, etc. [1]. Among possible formulations, the mixture based on vaterite ($CaCO_3$) and brushite ($CaHPO_4$, $2H_2O$) solid phases can be used as bone substitute. This metastable mixture evolves progressively, with time spent in humid conditions, into biomimetic carbonated apatite [2] analogous to bone mineral [3]. CPCs can also advantageously be combined with organic (bio)molecules/drugs to convey additional properties. Taking into account the risks of infections in orthopedic and maxillofacial surgeries, conferring antibacterial properties to CPC formulations is an appealing approach. Different strategies have been explored then such as the addition of antibiotics [4]. Although their antibacterial effect has been proven [5], few specific studies have been dedicated to bacterial resistance. The development of antibiotic-resistant bacterial strains incites to develop strategies for more local delivery to limit the dose needed [6]. Also, it is pertinent to search alternative/complementary strategies. In response to this antibiotic-resistance threat [7], lipid oligonucleotides (LONs) have been developed [8]. The present work aims at setting up a bioactive cement formulation, involving both antibiotic and LONs to address the issue of bacterial resistance.*

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