Comparison of SLA/PAM calcium phosphate parts for bone tissue engineering

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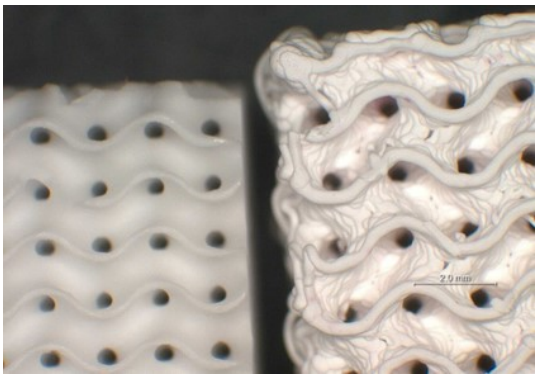
Bone grafting is used in a number of situations: in the case of fractures with significant bone loss, tumors, malformations and so on. Autogenous bone grafting remains the gold standard, as it obviously meets all the requirements for an ideal substitute (biocompatibility, osteoinduction, osteoconduction, bone-like structure, etc.). There are, however, several disadvantages: the need for a second surgical operation (often involving general anaesthesia and the risk of infection), or lack of availability (bone banks are not sufficient to meet demand).

Synthetic substitutes based on calcium phosphate help to overcome this lack of availability but have not yet succeeded in completely replacing the "gold standard" of natural bone.
However, thanks to additive manufacturing technologies, it is now possible to mimic the structure of natural bone. Using calcium phosphates as materials, the chemical and biological properties are even almost similar to those of natural tissue.
In this work, two additive technologies (stereolithography - SLA and additive manufacturing pellets - PAM) are used to demonstrate the possibility of manufacturing macroporous calcium phosphate-based bone substitutes (hydroxyapatite, tricalcium phosphate and their biphasic mixture). A comparative characterization of the parts obtained by the two technologies is proposed, down to the in vivo testing.



Hydroxyapatite scaffolds manufactured by SLA (left) and PAM (right)