

# BIOMATERIALS

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## Novel resorbable and osteoconductive nurse's A phase-silicocarnotite scaffold induced bone formation

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Alternatives to natural bone grafts are needed in a society that progressively prolonged life expectancy, and it should address the health problems of an aging population. In this context calcium silicophosphate scaffolds are promising candidates. Composition belongs to subsystem Nurse's A-phase-Silicocarnotite was selected for the ceramic scaffolds that were prepared by the polymer replication method. An interconnected porous structure with a striking similarity to human cancellous bone tissue was obtained. Response to ceramic scaffolds was evaluated by implantation in New Zealand tibia rabbits in periods of 3 and 6 months. Radiological studies showed correct integration and partial resorption of the scaffold. Histological results presented no evidence for inflammation or infection at the implantation sites. Colonization process of the scaffold started in the periphery and then penetrated throughout implant porosity. Scaffolds degraded over time and that degradation happened according to the tissue in-growth rate. Histomorphometric analysis gave high BIC values ( $67.30\% \pm 1.41$ ) opposite to control samples, where newly formed bone in the cortical defect increased in a smaller amount than in the grafted defects. After six months of implantation SEM studies reveal that the whole ceramic implant surface was covered by a newly formed bone tissue. The new bone layer was composed of Ca-P, mainly with traces of Si due to the gradual diffusion of Si ions from the scaffolds into the newly forming bone, which formed part of the biomaterial's resorption process. The results indicate that this material provides an optimal microenvironment for the osteogenic differentiation of the undifferentiated osteoblastic precursor cells contained in hematopoietic bone marrow.

### Biography

Patricia Mazón studied Chemistry at the University of Alicante, and pursued her PhD about aminoacids synthesis. She started her adventure in Biomaterials field in 2012 at the University Miguel Hernández. Currently, she is a Professor at the Department of Materials Science, Optic and Electronic Technology and Researcher at the Biomaterials area of Bioengineering Institute.

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