

Partners



ULPGC - Universidad de Las Palmas de Gran Canaria
www.ulpgc.es



UCL - University College London
www.ucl.ac.uk



UMINHO - Universidade do Minho
www.uminho.pt

Universidade do Minho



RNOH - Royal National Orthopaedic Hospital NHS Trust
www.rnoh.nhs.uk



XJTU - Xi'an Jiaotong University
en.xjtu.edu.cn



SHIM - Shaanxi Hengtong Intelligent Machine Co, Ltd.
www.china-rpm.com/en



ZJU - Zhejiang University
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Marie Skłodowska-Curie actions



As of January 2014, with the move to Horizon 2020, the Marie Curie Actions are called the **Marie Skłodowska-Curie actions (MSCA)**. MSCA support research training and career development focused on innovation skills. There are MSCA grants for all stages of a researcher's career which encourage transnational, intersectoral and interdisciplinary mobility.



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Biomaterials and Additive Manufacturing: Osteochondral Scaffold innovation applied to osteoarthritis

H2020-MSCA-RISE-2016-734156



The project **BAMOS**, funded under the **Research and Innovation Staff Exchanges (RISE) action** (H2020 Marie Skłodowska-Curie actions), addresses the challenges in osteoarthritis treatment by providing novel cost effective osteochondral scaffold technology for early intervention to delay or avoid joint replacement operations. This project has the potential to relieve pain in patients with OA improving their quality of life by keeping people active. It fits with the scope of EU Societal Challenges to encourage the provision of improved clinical care for patients in the field of healthcare, especially for elderly patients.

Motivation

Osteoarthritis (OA) is a degenerative joint disease, typified by a loss of quality of cartilage and changes in bone at the interface of a joint. Patients with OA often suffer **pain, loss of mobility** and go on to require an end stage total **joint replacement**. According to the World Health Organisation, 40% of people over 70 years old have OA, and the figure is set to increase with the ageing problem.

Commercially available scaffolds have been used for the treatment of small cartilage and osteochondral defects. However, none of these products promote satisfactory durable regeneration of **large osteochondral defects**.

Objective

BAMOS will develop new materials and additive manufacturing (AM) technologies for the fabrication of **custom-tailored osteochondral scaffolds**. The new technologies will undergo full pre-clinical evaluation in order that the scaffolds are able to enter clinical trial after the project.

Activities

Titanium scaffolds

- Titanium scaffolds obtaining by AM
- Optimization by FEM and genetic algorithms
- Testing of Ti alloys: mechanics, corrosion...
- Coating of scaffolds to improve osseointegration
- In vitro and in vivo evaluation of osteochondral scaffolds

Biopolymeric scaffolds

- Biomaterials characterization and testing: mechanics, biodegradation...
- Bioinks, hydrogels and ceramic materials development and characterization
- Biofabrication of osteochondral scaffolds and hierarchical structures by AM
- Coating of polymeric scaffolds with bioactive substances to increase cell affinity
- In vitro and in vivo evaluation, including cartilage section and subchondral bone section

Clinical experience

- Understanding clinical needs: definition of scaffolds functionality and required performance
- Clinical imaging: microCT, CMM. 3D printing and CAD model reconstruction
- Cell culturing: testing in human tissue explant (in vitro) and in clinical animal models (in vivo)



Actions

The BAMOS project is structured in **nine work packages**.

Impact

- 1** Either early stage researchers or experienced researchers have the opportunity to **enhance their career development** by taking advantage of the exchange program and knowledge transfer within BAMOS.
- 2** BAMOS provide the opportunity to the partners to **share knowledge from different fields** but with high level of complementarity.
- 3** The proposal aims at significantly constructing a network of beneficial international research collaborations, in the fields of tissue engineering and additive manufacturing, between **seven internationally leading research organisations** (from Europe and China).
- 4** The long-lasting relationship which can be foreseen with the Chinese partners involved in the research ensures the contribution of this project to the objectives of **increasing international cooperation** and opening European researchers to the world.
- 5** The partners will disseminate BAMOS results to a broad audience within the medical and AM sectors, as well as to the biofabrication industry. The consortium will organise **two international scientific conferences** (one in the EU, one in China) **and three workshops**.