Title: **New synthetic startegies for the synthesis of multifunctional peptidic platforms with osteoinductive potential.**

Student: Iván Sánchez Campillo

Date: June 2019

Supervisor/s: Dr. Vicente Marchán Sancho
Departament de Química Inorgànica i Orgànica

Dr. Carles Mas Moruno
Biomaterials, Biomechanics and Tissue Engineering (BBT), Universitat Politècnica de Catalunya (UPC)

Dra. Helena Martín Gómez
Biomaterials, Biomechanics and Tissue Engineering (BBT), Universitat Politècnica de Catalunya (UPC)

In biomaterials science, peptides are widely used to functionalize material surfaces and confer biological potential (i.e. bioactivity) to otherwise inert substrates. The attachment of biomolecules to material surfaces is commonly achieved by using specific anchors with chemical affinity for the substrates. Well-known examples include the use of amines to bind polymers through amide bonds, thiols to bind gold substrates or catechol groups to bind titanium and other metallic oxides. However, this implies that each synthesized peptide can be used only for a narrow range of materials. Thus, in most cases, changing the material of study requires synthesizing the same peptide with a distinct anchor, resulting in time-consuming and repetitive procedures.

To solve this, this project aims to develop a novel and versatile click-based solid-phase synthetic strategy to prepare peptidic coatings for a variety of biomaterials. In detail, the project focuses on the solid-phase peptide synthesis of a branched peptidic structure (containing the RGD and DWIVA peptide sequences) and the optimization of the copper-catalysed azide-alkyne cycloaddition reaction to introduce three anchoring groups, namely an amine, a thiol and a catechol, to the peptidic backbone in solid phase.

By means of solid-phase synthetic methods and characterization by analytical HPLC and mass spectrometry, the feasibility of this strategy has been demonstrated. It is expected this new method will find applications to coat a wide range of biomaterials in a straightforward and cost-efficient fashion.

Keywords: peptide synthesis, click chemistry, multifunctionalization, chemical strategies