PhD in Materials Science and Technology

Research Title:
Photocurable hydrogels for tissue engineering

Funded by
Ateneo

Supervisor
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Context of the research activity
Polymeric hydrogels can be used in tissue engineering mainly because of their ability to provide environments that are like hydrated tissues. Furthermore, they can reproduce the extracellular matrix (ECM) structure and allow cell adhesion and proliferation. Also, hydrogels, can be designed to gel in-situ, so to behave as scaffold and cell-carrier. The objective of the InPry-Hydro project is to make a significant contribution in the development of new biobased injectable or 3D-printable hydrogels characterized by ultrafast formation rate, controlled microstructure, biocompatibility and good mechanical properties. The objective is both the design and synthesis of new materials and exploiting advanced technologies such as 3D printing. The new materials can be modelled taking into consideration the different mechanical performance requested for the different tissue to be replaced.

Objectives
The candidate will achieve the target of the project by the following research steps:

- New photocurable materials from synthetic monomers or biorenewable will be investigated for the preparation of hydrogels systems, in particular taking into consideration their reactivity and biocompatibility.
- UV-Curable formulations will be design following the needs of different targeted tissues and for the different applications (injectable or 3D-printable hydrogels).
- 3D-printing technologies will be used for the hydrogel’s preparation to build structures with high resolution and...
- Biocompatibility and cytotoxicity of the printed structures will be studied and modification of the formulations and printing parameters will be defined accordingly.

| Skills and competencies for the development of the activity | Good knowledge of chemistry and Polymer Science and technology. Knowledge on photopolymerization and good skills in laboratories for the synthesis of hydrogels. |