



Research Doctorate (Ph.D.) in Chemical Sciences
32nd Cycle – Academic Year 2016/2017

Tutor:

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Project Information

1 - Research project title

NATURE-INSPIRED ANTIOXIDANTS AND REDOX-ACTIVE ORGANIC SYSTEMS FOR BIOMEDICAL RESEARCH AND APPLICATIONS

2 - Key words

Phenolic polymers; catechols; melanins; antioxidants; functional materials

3 - Abstract

The imitation of Nature's principles has emerged as a major competitive strategy for the design of functional molecular devices and systems for biomedical applications. Phenols and polyphenols provide the core reactive unit in a number of bioactive compounds and biopolymers, including catecholamines, plant antioxidants, complex polyphenolic systems and biopolymers such as the melanins. Catechols and polyphenolic compounds are increasingly investigated and exploited as antioxidants, food supplements and more recently as functional biocompatible components for hydrogels, sensors and other functional systems. Eumelanins and other phenolic polymers, such as polydopamine are the focus of growing interest for surface coating, antifouling, underwater adhesion, drug delivery, biosensing and as interfaces in bioelectronics. The present project is aimed at exploiting or mimicking natural phenolic systems to translate their UV-absorbing, photoconductive, metal binding, redox and free radical scavenging properties into new functional soft, robust, adhesive, multifunctional and biocompatible materials and molecular systems for various biomedical applications.