

**Call for application for research scholarships  
for post-graduate international candidates**

**RESEARCH PROJECT N. 9**

**Title**

**Biobased Composite Nanofibrous Membranes for Smart Packaging**

**Scientific responsible (name, surname, role)**

Roberta Maria Bongiovanni, Full Professor ([roberta.bongiovanni@polito.it](mailto:roberta.bongiovanni@polito.it))

**Short description of the research activity (max 250 words)**

This research work aims at the fabrication of nanostructured biobased functional membranes for smart food packaging in order to increase the control over food quality and safety by constantly monitoring the food using nanosensors embedded in the packaging material.

The nanofibrous membranes will be based on natural polymers (e.g. chitosan and other cellulose derivatives) and carbon nanofillers such as graphene, properly modified and functionalized, to impart sensing properties. Their preparation will be accomplished coupling electrospinning and photoinduced chemical processes. The proposed approach will allow the production of nanostructured functional membranes, with unique properties, including recyclability, and advanced performance. Electrospinning is the most versatile and promising technology for the mass production of nanofibrous materials with extraordinary control over their structure and properties. Photoinitiated processes are a wide range of fast and eco-friendly processes that use light to induce chemical reactions: throughout the project, UV radiation will be used for crosslinking the nanofibers, tuning their mechanical properties and their stability; reversible reactions will be preferred in view of depolymerizing and thus recycling the material. In the project, the fabrication process and the final properties of the nanofibrous materials will be optimized in order to obtain the desired fiber diameter, filler concentration, mechanical, thermal and sensing properties and to meet the demands of end application. The resulting composite fibers will be characterized by optical and electron microscopy, thermal and mechanical analysis, IR spectroscopy, permeability and conductivity tests.

**Specific requirements (experiences, skills)**

Experience in laboratory work

Knowledge of polymer science

**Website of the research group (if any)**

[http://www.disat.polito.it/research/research\\_groups/polymat](http://www.disat.polito.it/research/research_groups/polymat)

**Keywords (min 3, max 6)**

Packaging, electrospinning, reversible photocrosslinking, recyclability, biobased fibers

**Research Area (max 1)**

Chemistry and Material Science