

# FINAL MASTER PROJECT PROPOSAL



## Title

**Study of the antimicrobial and antioxidant properties of magnesium oxide nanoparticles and their potential for the development of new active food packaging solutions**

## Supervisor(s)

**Dr Scott G. Mitchell**  
**Dr Filomena Silva**

## Summary of the project

Nowadays, consumers are increasingly aware of what they eat, requesting safer and minimally processed foods. These requirements and preferences have driven research into a scenario where active packaging is considered the most capable option. It is expected that the global market of active and intelligent packaging will continue to grow, reaching a compound annual growth rate of 6.9%. The active packaging protects the food by extending its useful life and at the same time guaranteeing its safety, thus avoiding addition of chemical products directly to food. The materials that constitute the active packaging contain added substances that can act in various ways: as antimicrobials, antioxidants or absorbers of undesirable substances, which interact actively with the atmosphere of the container or with the food to avoid chemical oxidation processes, microbial growth and other ways, through which the food may suffer deterioration or alteration of its organoleptic properties. With respect to the development of packaging materials with antimicrobial or antioxidant properties, the main described use for nanotechnologies is the encapsulation of other active compounds, in order to solve problems related to the stability of the active compound or to achieve its controlled release and thus obtain a better efficacy of the package developed. On the other hand, the development of active packaging based exclusively based on nanomaterials, with antimicrobial or antioxidant intrinsic properties, remains scarce and is mainly based on silver, titanium dioxide, zinc oxide or nanoselenium nanoparticles, carbon nanotubes or nano-chitosan

In this work, we will study the antioxidant and antimicrobial properties of magnesium oxide nanoparticles (MgO NPs) for the development of a new active food packaging materials.

This integrative project dealing with the application of MgO NPs involves several multidisciplinary tasks starting with the synthesis and physical-chemical characterization of MgO nanoparticles, followed for the evaluation of its biological properties, culminating in the possible development of a new active food packaging:

Task 1: Synthesis & characterization of MgO NPs

Task 2: Study the antioxidant properties of MgO NPs

Task 3: Evaluate the antimicrobial properties of MgO NPs against foodborne bacteria & moulds

Task 4: Develop active packaging for different food products.

Task 5: Assess the antioxidant/antimicrobial properties of the newly developed active packaging on food shelf-life.