# A bioinspired material for bone tissue regeneration: use of Ganoderma sessile mycelium as microstructure director.

Noelia L .D'Elía[1*]; Javier Sartuqui[1]; Damián Placente[1]; Pablo Postemsky[2]; Paula Messina[1].

[1]INQUISUR–CONICET, Department of Chemistry, Universidad Nacional del Sur, CPB B8000 Bahía Blanca, Argentina

[2]Laboratory of Biotechnology of Edible and Medicinal Mushrooms, Centro de Recursos Naturales Renovables de la Zona Semiárida (CERZOS-UNS/CONICET), Buenos Aires, Argentina

[*]Corresponding author: nldelia@inquisur-conicet.gob.ar

## Introduction

The development of new strategies to repair large segmental bone defects is currently an open challenge all around the world, and biomaterials suitable for this purpose are in high demand. An important aim in this field is to achieve simultaneously both the mechanical and biological requirements of the implant site.

## Methodology

In this study, we propose to obtain a bioinspired bone tissue substitute by using the stiff and modulable mycelium of Ganoderma sessile. The mycelium was cultured on a substrate composed of Alginate crosslinked by Hydroxyapatite nanoparticles (ALG-HAn), with in vitro osteogenic properties previously verified by the authors. Then, the mycelium was inactivated and sterilized by autoclaving to obtain the final biomaterial.

## Results

Using scanning electron microscopy (SEM) it was possible to confirm that the mycelium acts as a directing agent of the biomaterial microstructure. The mycelium colonized the ALG-HAn substrate leading to the formation of a trabecular bone-like network with a hierarchical structure. Moreover, static water contact angle assays demonstrated that the presence of ALG in the membranes significantly reduced the hydrophobicity of the biomaterials. Finally, to test cells blood interaction with the biomaterial we verify the lack of hemolysis in human plasma samples.

## Conclusion

The promising results of this work will provide a new perspective for the future development of mycelium-based biomaterials applied for bone tissue regeneration.

## Keywords

Mycelium; alginate; hydroxyapatite; Ganoderma