

# **Calcium Carbonate and Hydroxyapatite Biomineralization of Chitin Utilizing TEMPO Oxidation and Poly(acrylic acid) Modification**

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## **Abstract**

The polysaccharide chitin is found in the natural world as a major component of biominerals, such as mollusk shells, providing mechanical properties such as impressive tensile strength. This research project sought to reinforce mushroom-derived chitin scaffolds with minerals using the introduction of polyanionic functional groups to enhance organic-inorganic mineralizations and achieve a more robust and homogenous mineralization. The minerals reviewed were calcium carbonate and hydroxyapatite, which are commonly found in osseous tissues of different organisms. Using a TEMPO oxidation procedure for calcium carbonate mineralization and poly(acrylic acid) for hydroxyapatite mineralization, more extensive and homogeneous mineral depositions were found in the chitin matrices, when compared to non-functionalized controls. XRD, FT-IR and Raman spectroscopy were used to study the mineral phases, while SEM and AFM microscopy of chitin scaffolds showed enhanced exterior and interior mineralization and a more homogeneous mineral deposition.