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DEVELOPMENT OF CALCIUM CARBONATE PATTERNS IN ORGANIC MATRIX

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Introduction. The study on the development of calcium carbonate patterns in an organic matrix has significant relevance in various fields, including materials science, biomimetics, and biomineralization. Understanding the formation and control of calcium carbonate patterns can provide insights into the design and fabrication of biomimetic materials with tailored structures and properties. This research can also contribute to the development of advanced materials for applications in tissue engineering, drug delivery, and environmental remediation. [1].

Main part. Calcium carbonate and hydroxyapatite are two commonly used materials in bone regeneration. While both have their advantages and applications, calcium carbonate offers several benefits that make it a preferred choice in certain scenarios.

The rate of calcium carbonate's biodegradability is higher compared to hydroxyapatite. Calcium carbonate promotes better integration and compatibility with the surrounding bone tissue. Calcium carbonate provides a sustained source of calcium ions, essential for bone growth [2].

Thus, hydroxyapatite is preferred in a number of clinical cases where it is necessary for the body to convert the introduced material into hydroxyapatite.

A methodology has been developed to study the formation of calcium carbonate patterns in an organic matrix. The factors influencing the formation of calcium carbonate patterns have been explored.

The SEM images show the intricate structures of $CaCO_3$ patterns. At lower magnifications, the patterns exhibit interconnected networks or clusters, suggesting organization and connectivity. At higher magnifications, the individual particles appear irregular in shape and size, contributing to the unique and heterogeneous nature of the patterns. These images highlight the potential of calcium carbonate patterns for biomimetic materials design in bone regeneration applications.

The XRD pattern of copper carbonate patterns shows characteristic peaks at 2θ angles of 25°, 30°, 36°, 47°, 55° and 67°. These peaks confirm the presence of crystalline phases in the patterns, indicating a well-defined crystal structure. Thus, the crystalline nature of calcium carbonate and support its potential for biomimetic materials design in bone regeneration [3].

Conclusions. Calcium carbonate and hydroxyapatite are commonly used materials in bone regeneration. The choice between them depends on specific factors and treatment goals. A methodology has been developed to study the formation of calcium carbonate patterns in an organic matrix, highlighting their potential for biomimetic materials design in bone regeneration. XRD patterns confirm the presence of crystalline phases, supporting calcium carbonate's potential in bone regeneration.

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