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Abstract

Potential Application of Apatitic Materials Substituted with Co and Zn as Antimicrobial Treatment in the Preservation of Cultural Heritage †

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1. Introduction

Cultural heritage has a major importance, as it represents human identity and evidence of existence and activities that people have left over time. Any heritage object, whether movable or immovable, represents a small part of human history, passed down from generation to generation. By using the term tangible cultural heritage, we refer to different types of artifacts (paintings, drawings, prints, sculptures, etc.), monuments and historical buildings, as well as archaeological sites. The factors that lead to the degradation of cultural heritage are multiple, uncontrollable, caused by nature (rain, temperature, light, biodegradation) or by humans (pollution, urbanization, agglomerations, acts of terrorism, corruption or incompetence). For this reason, its conservation represents a major objective, and the development of different compounds with a consolidating or protective role that do not affect the different properties of objects (appearance, color, etc.) is of major importance [1]. Nanomaterials represent a new and innovative solution under development with the role of saving heritage without affecting it and extending its lifespan for many generations to come [2]. Hydroxyapatite is a product highly studied in recent years due to the many positive results obtained in various fields such as: implantology, orthopedic surgery, catalysis, biosensors, adsorption, protection of cultural heritage, etc. In this study we synthesized two types of substituted apatitic materials with heavy metals (Zn, Co), using two different methods (co-precipitation and ultrasonication), at different molar ratios, as well as their antimicrobial properties [3].

2. Materials and Methods

The synthesized materials were characterized by the following methods: X-ray diffraction (XRD), X-ray fluorescence (XRF), Fourier transform infrared spectroscopy (FTIR), while their antimicrobial activity was evaluated using the method of minimum inhibitory concentrations and the method of minimum concentrations of biofilm eradication.

3. Conclusions

The obtained results allow the proposal of the synthesized materials as viable alternatives in the protection of cultural heritage artifacts.

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