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The Development of Innovative Materials with a Role in the Conservation and Reinforcement of Wooden Heritage Objects †

Toma Fistos [1,2,*], Roxana Ioana Matei (Brazdis) [1,2], Anda Maria Baroi [1,3], Irina Fierascu [1,3], Radu Claudiu Fierascu [1,2], Tanta-Verona Iordache [1] and Sorin-Viorel Dolana [1]

[1] National Institute for Research & Development in Chemistry and Petrochemistry (ICECHIM), 202 Spl. Independentei, 060021 Bucharest, Romania; roxana.brazdis@icechim.ro (R.I.M.); anda.baroi@icechim.ro (A.M.B.); irina.fierascu@icechim.ro (I.F.); fierascu.radu@icechim.ro (R.C.F.); tanta-verona.iordache@icechim.ro (T.-V.I.); sorin.dolana@icechim.ro (S.-V.D.)
[2] Faculty of Chemical Engineering an Biotechnology, National University of Science and Technology Politehnica Bucharest, 1-7 Gh. Polizu Str., 011061 Bucharest, Romania
[3] Faculty of Horticulture, University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Marasti Blvd., 011464 Bucharest, Romania
* Correspondence: toma.fistos@icechim.ro
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Abstract: The main objective of this study is the development of a material with a role in the conservation, preservation, and reinforcement of cultural heritage objects, especially those based on organic support material (ex: wood).

Keywords: polyurethane foams; antimicrobial nanocomposites; biomedical applications

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1. Introduction

Cultural heritage can be defined as the totality of physical artefacts and intangible aspects that past generations leave as a legacy to future generations. One of the most well-known roles of cultural heritage is the historical one, because it represents a continuous source of knowledge and learning, but not only that—it has special economic importance, on the basis of which several countries substantially develop economically by exploiting heritage from the point of view of tourism and the conservation issues raised by it, thus contributing to the development of multiple scientific branches in their attempt to develop different materials to protect it. The causes of the degradation of cultural heritage are multiple and uncontrollable. The main degradation factors are represented by environmental factors that are constantly developing and that, in recent years, have become more aggressive and more frequent than ever. In this category, we can include strong wind, heavy rains, hurricanes, and blizzards. A second factor is man himself and his evolutionary progress. This category includes pollution, urban development, or deliberate destruction through various conflicts or vandalism [1–3].

2. Materials and Methods

The obtained material consists of 2 components: an antimicrobial part represented by a phosphatic material (i.e., hydroxyapatite), with the role of providing the protection of organic materials against various fungi and bacteria, and a polymeric part (i.e., polyurethane) that will provide the compatibility between the consolidating material and the organic support material from which the heritage object is made [4].

3. Results

Below is displayed a SEM image of one of the hydroxyapatite samples (Figure 1) obtained in this research.

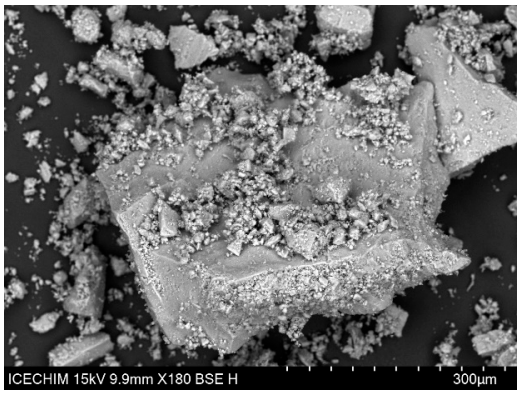

Figure 1. SEM image of hydroxyapatite material substituted with zinc.

4. Conclusions

In this stage, various apatitic materials substituted with heavy metals were synthesized in different molar ratios using the co-precipitation method. To confirm the materials of interest were obtained, they were morpho-structurally analyzed using different techniques: XRD, XRF, FTIR, and SEM-EDS.

Author Contributions: Conceptualization, T.F. and R.C.F.; methodology, S.-V.D., T.-V.I., and I.F.; formal analysis, R.C.F., I.F., and T.-V.I.; investigation, R.I.M., A.M.B., T.F., and S.-V.D.; writing—original draft preparation, T.F., R.I.M., A.M.B., and S.-V.D. writing—review and editing, R.C.F., I.F., and T.-V.I.; supervision, R.C.F., I.F., and T.-V.I.; project administration, T.F. All authors have read and agreed to the published version of the manuscript.

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