






Abstract

Multifunctional Composite Materials (with Consolidation, Self-Cleaning and Antimicrobial Properties) Applicable for the Preservation of Inorganic Substrates[†]

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Abstract: The aim of this study is to synthesize different polymeric solutions by mixing different types of polymers, metallic oxides and hydroxyapatites in different ratios suspended in alcoholic solutions and to evaluate the effectiveness of the obtained solutions by testing them on the most common types of bricks (adobe, classic, fire and cement).

Keywords: cultural heritage; inorganic materials; consolidation; self-cleaning; anti-microbial effect



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1. Introduction

Due to the fact that we live in a continuously developing world, the degradation processes of heritage objects remain inevitable over time. For this reason, the continuous development of advanced materials capable of counteracting specific degradation processes is important. The destruction of heritage objects is usually linked to biological corrosion, caused by various microorganisms that include enzymes, organic and inorganic acids, amino acids, organic compounds, toxins, pigments, etc. The mechanism of damage mostly depends on the structure of the materials on which the microorganisms involved in biodeterioration grow, while the chemical composition of the substrate determines the type of microorganism. Due to the problem this research addresses, the multifunctional materials that will be obtained within this project will contribute to its sustainability after the implementation period [1–4].

2. Materials and Methods

In this study, different polymeric solutions were synthesized. The polymeric solutions were obtained by mixing different types of polymers, metallic oxides and hydroxyapatites in different ratios suspended in alcoholic solutions. To test the effectiveness of the obtained solutions, we manufactured as an inorganic support the most common types of bricks

(adobe, classic, fire and cement) used in different heritage monuments. The obtained solutions were tested by different techniques to check if they have antimicrobial, hydrophobic and photocatalytic properties.

3. Results

Below is displayed a picture with classic bricks treated with the six different polymeric compounds (Figure 1).

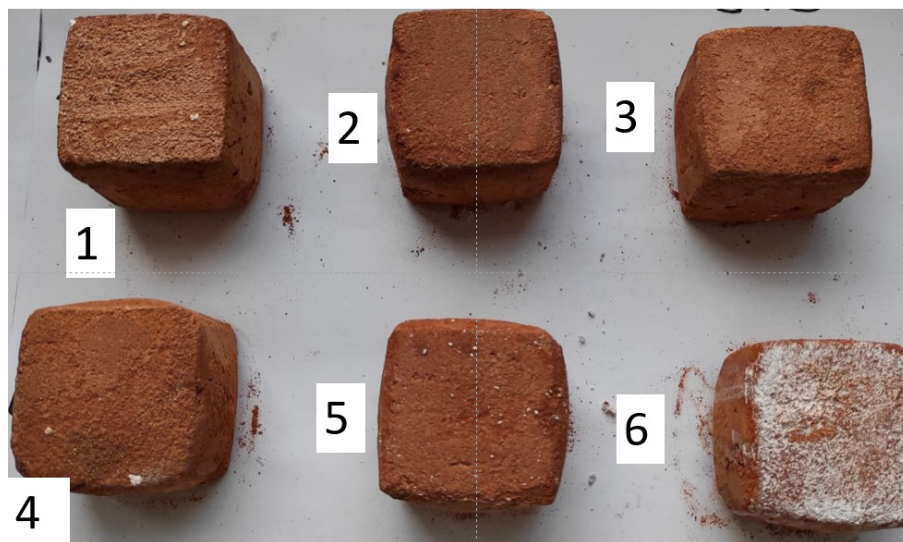


Figure 1. Classic bricks on which the obtained polymer solutions were applied.

4. Conclusions

Both the inorganic support materials and the multifunctional polymer solutions were successfully obtained and the antimicrobial, hydrophobicity and photocatalytic tests showed promising preliminary results.

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