



## Synthesis and characterization of functional sol-gel based geopolymer matrices used for the conservation and restoration of cultural heritage

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### Introduction

Geopolymers are inorganic materials composed mainly of aluminates and silicates, similar to ceramics [1]. Geopolymerization is a process that occurs by treating inorganic materials of orthosilicate and aluminate with an alkaline solution. Natural clays are commonly used in the synthesis of geopolymers, in particular, this work focuses on the chemical manipulation of the geopolymer, through the use of sol-gel hybrid coatings.



### Results and Discussion

The properties of geopolymers, such as mechanical and thermal resistance, water repellency, chemical inertness, and porosity, are improved using waste paper scraps and sol-gels in geopolymer matrix [2].

### Conclusions

The corrosion resistance and hydrophobicity of these geopolymeric monoliths are tested by immersion and wettability tests; microbial growth tests were also conducted to verify the antibacterial and antifouling activity.

### Bibliography

- [1] Z. Mašek et al. 2018, 58, 3, 184–188..
- [2] S. A. Ruffolo et al. Prog. Org. Coatings, 2017, 104, 64–71.
- [3] M. Reyes-Estebanez, et al. Herit. Sci., 2018, 6, 1, 1–11.



Before t=48h immersion test



After t=48h immersion test



Wettability test  
on untreated geopolymer



A geopolymer treated with superhydrophobic sol-gel.  
(patent protected formulation)

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