

FUNCTIONAL INORGANIC GEOPOLYMER COATINGS FOR DIFFERENT APPLICATIONS

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Coatings can have different functionalities such as protection to improve durability and longevity and prevention from fire, corrosion and environmental constraints. The objective of this study is to demonstrate the suitability of geopolymer coatings for different applications such as the restoration of historical monuments, corrosion prevention and fire resistance. For this, on one hand, geopolymer coating, on five mineral substrates (white and blue limestone, concrete, plaster and stone), was investigated. On the other hand, geopolymer coating on stainless steel plates was studied. In order to waterproof the geopolymer surface, a mineral hydrophobic coating was also developed. Pull-off tests were performed to determine the adherence. For mineral substrates, it was demonstrated that the geopolymer coating can be successfully applied by airbrush with a thickness varying between 340 and 650 μm . This thickness is related to the coating features such as viscosity, liquid to solid ratio and the substrate surface roughness. High adhesive strength (up to 9 MPa, Figure 1) were obtained. The adhesion was also evidenced by SEM observations and concentration profiles. For stainless steel, the adhesive strength is about 3 MPa. A good fire resistance was obtained. Moreover, salt spray tests have shown a resistance to corrosion for 1600 hours. Finally, the application of a mineral hydrophobic coating permits to increase the wetting angle to 100° . These results confirm the suitability of geopolymer coating for restoration or corrosion protection applications.

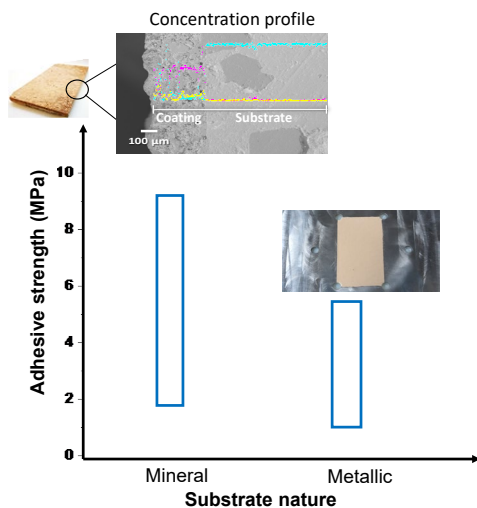


Fig. 1 – Adhesive strength of geopolymer coatings on different substrates