



5th Historic Mortars Conference

HMC 2019

Book of Abstracts

University of Navarra, Pamplona

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Active photocatalytic-superhydrophobic coating with TiO₂-ZnO nano-heterostructures for lime mortars

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Abstract

Active coatings to be applied onto hardened surfaces of lime rendering and masonry mortars and stones of the Built Heritage were developed. Nano-heterostructures of TiO₂-ZnO (50:50 and 10:90) were obtained by Flame Spray Pyrolysis as photocatalytic agents with expanded sensitivity towards solar light, instead of the restricted UV dependence of the pure TiO₂ or ZnO. A superhydrophobic medium was simultaneously prepared and photocatalytic nanoparticles were added to obtain the coatings. The active products were expected to prevent the water absorption of the substrates and the subsequent degradation effects as well as to allow the stones and mortars to act as self-cleaning materials, reducing the dirt deposition and the biological colonization. Dispersions were applied onto the surface of lime mortars and siliceous stone. Measurements of the photocatalytic oxidation activity of the coatings were carried out by means of the NO degradation, showing a very good efficiency of the nanoparticles even at long term tests (values of NO oxidation of ca. 35%). Water contact angle (WCA) assessment evidenced a strong hydrophobization of the treated surfaces, with WCA values higher than 140°. The results proved the synergistic effect of these coatings with respect to the durability of the treated substrates, giving rise to a promising way of preventive conservation for building materials of the Cultural Heritage.

Keywords

Lime Mortars; Nanoparticles; Photocatalytic Activity; Coatings

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