

Air-Purifying Properties of Cement Mortars Intermixed with TiO₂-SiO₂ Composites

Authors : A.M. Kaja, Q. Yu, H.J.H Brouwers

Abstract : An increased functionality of concrete towards higher eco-efficiency is nowadays of great importance due to the decreasing air quality in urban areas. Surface modifications of concrete walls and roads, as a coating or an intermixing of the surface layer with TiO₂, provide an opportunity to improve the air quality by reducing NO_x via photocatalytic phenomena. Nevertheless, there are still concerns regarding the cost-efficiency as well as the toxicity of intermediate products which can be produced during the photocatalysis, limiting a widespread adoption of these materials. This study addresses the problem of the selectivity of cement mortars towards nitrate in terms of microstructural characteristics and hydration products. The ability of cement mortars matrix intermixed with commercial TiO₂ and TiO₂-SiO₂ composite to abate NO₂ is investigated. The influence of hydration products formed under the carbonation facilitating conditions is discussed and solutions how to optimize the mix design are proposed. The incorporation of the TiO₂-SiO₂ composite into cement mortar is found to increase the nitrate selectivity index.

Keywords : cement matrix, NO₂ abatement, photocatalysis, TiO₂-SiO₂ composite

Conference Title : ICNEEC 2018 : International Conference on Nanotechnology for Eco-Efficient Construction

Conference Location : Paris, France

Conference Dates : October 29-30, 2018