C-2-2 Effect of nano-TiO_2 on polymer-cement based materials - A bi-functional coating: waterproof and self-cleaning

Han Wang
Shandong Provincial Key Laboratory of Preparation and Measurement of Building Materials, University of Jinan, Jinan, China.
School of Material Science and Engineering, University of Jinan, Jinan, China.
han_tree@163.com

Piqi Zhao
1Shandong Provincial Key Laboratory of Preparation and Measurement of Building Materials, University of Jinan, Jinan, China.
School of Material Science and Engineering, University of Jinan, Jinan, China.

Honghua Liu
Shandong Provincial Key Laboratory of Preparation and Measurement of Building Materials, University of Jinan, Jinan, China.
School of Material Science and Engineering, University of Jinan, Jinan, China.

Shoude Wang
Shandong Provincial Key Laboratory of Preparation and Measurement of Building Materials, University of Jinan, Jinan, China.
School of Material Science and Engineering, University of Jinan, Jinan, China.

Lingchao Lu
Shandong Provincial Key Laboratory of Preparation and Measurement of Building Materials, University of Jinan, Jinan, China.
School of Material Science and Engineering, University of Jinan, Jinan, China.

ABSTRACT

A bi-functional coating, nano-TiO_2 modified polymer-cementitious material, is designed to have both waterproof and self-cleaning. The composition, structure, properties and construction process of this composite material, especially the effect of nano-TiO_2 are investigated by mechanical test, weather resistance, CIE (L,a,b) colorimetric standard system, FTIR, SEM and XPS. The results reveal that nano-TiO_2 cannot only enhance the inherent mechanical properties such as tensile strength, bond strength and low temperature flexibity but also improve water and ultraviolet resistance. As the nano-TiO_2 being the active site can optimize network structure between polymer and cement hydration, compared with the conventional polymer-cementious coating, it can improve the bond and tensile strength by 59% and 25%, respectively. And the modified coating shows better self-cleaning properties, the results indicate that the maximum Rhb degradation of 90% was achieved. Moreover, it can significantly slow down the coating aging with aging coefficient decease of 28% . Eventually, the nano-TiO_2 modified organic-inorganic composite coating have the advantages: not only “hardness with softness”, excellent waterproof property, but also good ageing resistance and self-cleaning.