**NOVEL NANOPARTICLES OF TITANIUM DIOXIDE FOR APPLICATION ON CERAMIC ROOF TILES WITH ENHANCED PHOTOREFLECTIVE AND PHOTOCATALYTIC PROPERTIES**

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**ABSTRACT**

The aim of this work is the development of a new bioclimatic product, a roof tile with a thin film of nanomaterials on its upper surface. Nanomaterials of titanium dioxide in combination with two different kinds of polymers (Polyethylene glycol and Pluronic F-127) were developed. Different types of nanoparticles of TiO2 were chosen because of their ability to degrade organic pollutants, while being nontoxic materials and already well known for their photocatalytic and photoreflective properties. The insertion of amphiphilic polymeric materials leads to the encapsulation of the TiO2 nanoparticles and enhance their photocatalytic properties. Experiments with regard to the photocatalytic activity and the solar reflectance of the samples have also been conducted. Reflectance of the samples was measured by spectrometer IFS 113v, BRUKER with an integrating sphere. Results obtained from the photoreflectance experiments exhibited high values of reflectance in the Visible Light and Ultraviolet spectrum. The photocatalytic activity of the samples was evaluated by monitoring the decomposition of NO gas. The experimental photocatalytic set-up was developed by the research team and was composed by the reactor, an ultra-violet source, a target gas pollutant (NO) supply, flow rate valves and a photocatalytic chart station. NO gas with synthetic air were inserted into the chamber, where the prepared coated tiles were placed and subsequently irradiated with ultraviolet light. The decrease of pollutant concentration was recorded at predetermined time intervals. Results showed that all TiO2 photocatalytic coating samples exhibited high photocatalytic activity. This research was conducted as part of the research project “Green Tile Development-KERAMI” in collaboration with “KEBE-Northern Greece Ceramics” and was funded by the Operational Programme Competitiveness, Entrepreneurship and Innovation 2014-2020 (EPAnEK) of the Hellenic Ministry of Economy and Development.

**KEYWORDS:** TiO2 nanoparticles, cool roof, green clay roofing tiles, reflectance, photocatalysis