عنوان مقاله:

Preparation and characterization of concrete containing TiO2 nanoparticles for photocatalytic degradation of pollutants

محل انتشار:

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خلاصه مقاله:

Innovation of novel technologies such as biotechnology and nanotechnology in recent years has provided interesting trends in advanced materials and processes which are introduced for air and water purification, as well as agricultural and urban waste water refinery. A useful method for researchers is to use nano photocatalysts, especially titanium dioxide nanoparticles, to reduce environmental pollution of the micro organisms via oxidation and chemical reduction process. In this study, the photocatalytic and purifying capability of concrete samples containing TiO2 nanoparticles are investigated experimentally. Two concrete mix designs with water-binder (w/b) ratio equal to 0.45, including reference mixture (free of nano-TiO2) and a mixture contained 1% Nano-TiO2 by weight of binder were prepared. Concrete Samples were cured for 7 days in standard conditions. In the next step, photocatalytic degradation of standard Rhodamine-B solution (with chemical formulation of C28H31ClN2O3produced by Fluka Inc.) exposed to UV light in touch with concrete samples was studied by monitoring the gradient of solution's concentration versus time. This process performed by spectrophotometric analysis of both provided solutions (reference and 1% wt. containing nanoparticles) in 553nm wavelength. Obtained results illustrate that concrete sample containing nanoparticles would significantly reduce the solution's concentration via degradation of Rhodamine-B. Thus, while the cement consumption is reduced, concrete samples containing nanoparticles exhibit the photocatalytic and purifying capability. In the other hand, some improvements in mechanical properties (tensile and compression strength) have been observed in these samples

کلمات کلیدی:

Titanium Dioxide Nanoparticles, Concrete, Photocatalytic Degradation