High photocatalytic activity of immobilized non-crystalline nanometric titanium oxide: key role of interface

ANDREI KANAEV, LIMHP, UPR1311 CNRS, MOHAMED BENMAMI, LIMHP, University Paris-Nord, KHAY CHHOR, LIMHP, University Paris-Nord, INORGANIC NANOMATERIALS TEAM — Thinnest coatings prepared by chemical deposition of non-crystalline nanometric titanium oxide particles (2R=5.0 nm) show important photocatalytic activity, which can be higher than that of the reference sample, crystalline Degussa P-25 TiO$_2$. We describe an original method of the sol particles preparation and immobilization on complex supports in the sol-gel reactor. The effect of the coating thickness on its photocatalytic activity is studied. We show that the very first layer of the deposited nanoparticles possesses both high mechanically stability and the highest efficiency. We describe main features on the nanocoatings behavior in photocatalysis (gas-phase trichloroethylene degradation) and show that their internal efficiency increases with the decrease of the deposited mass. These results suggest a new approach to the active component design, while earlier non-crystalline TiO$_2$ has been considered inactive.

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