Abstract

A self-cleaning photocatalytic coating for limestone materials, based on TiO_2 nanoparticles obtained by the sol–gel process has been studied. TiO_2 sol was applied directly to the surface or after a SiO_2 intermediate layer. The selected test materials are the *Modica* and the *Comiso* calcarenites, limestones of *Ragusa Formation* outcropping in the South Eastern Sicily (Italy).

SEM–EDS, XRD and Raman investigations were carried out to characterise the TiO_2 nanoparticles and coating. Nanocrystalline anatase and, to a lesser extent, brookite forms are obtained. To evaluate the harmlessness of the treatment, colorimetric tests, water absorption by capillarity and crystallisation of salts measurements were performed.

Photocatalytic activity of the TiO_2 colloidal suspension and of the coatings (TiO_2 and SiO_2/TiO_2) was assessed under UV irradiation through methyl orange dye degradation tests.

The results show good photodegradation activity and satisfactory compatibility between the sol and the surface of the investigated limestones.