

## TiO<sub>2</sub>/Clay Minerals (Palygorskite/Halloysite) Nanocomposite Coatings for Water Disinfection

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**Abstract :** Microfibrous palygorskite and tubular halloysite clay mineral combined with nanocrystalline TiO<sub>2</sub> are incorporating in the preparation of nanocomposite films on glass substrates via sol-gel route at 450 °C. The synthesis is employing nonionic surfactant molecule as pore directing agent along with acetic acid-based sol-gel route without addition of water molecules. Drying and thermal treatment of composite films ensure elimination of organic material lead to the formation of TiO<sub>2</sub> nanoparticles homogeneously distributed on the palygorskite or halloysite surfaces. Nanocomposite films without cracks of active anatase crystal phase on palygorskite and halloysite surfaces are characterized by microscopy techniques, UV-Vis spectroscopy, and porosimetry methods in order to examine their structural properties. The composite palygorskite-TiO<sub>2</sub> and halloysite-TiO<sub>2</sub> films with variable quantities of palygorskite and halloysite were tested as photocatalysts in the photo-oxidation of Basic Blue 41 azo dye in water. These nanocomposite films proved to be most promising photocatalysts and highly effective to dye's decoloration in spite of small amount of palygorskite -TiO<sub>2</sub> or halloysite- TiO<sub>2</sub> catalyst immobilized onto glass substrates mainly due to the high surface area and uniform distribution of TiO<sub>2</sub> on clay minerals avoiding aggregation.

**Keywords :** halloysite, palygorskite, photocatalysis, titanium dioxide

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