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Peroxy-Titanium Complex-based inks for low temperature compliant anatase thin films

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Abstract

Stable highly crystalline titanium dioxide colloids are of paramount importance for the establishment of a solution-processable library of materials that could help in bringing the advantages of digital printing to the world of photocatalysis and solar energy conversion. Nano-sized titanium dioxide in the anatase phase was synthesized by means of hydrothermal methods and treated with hydrogen peroxide to form Peroxy-Titanium Complexes (PTCs). The influence of hydrogen peroxide on the structural, optical and rheological properties of titanium dioxide and its colloidal solutions were assessed and a practical demonstration of a low temperature compliant digitally printed anatase thin film given.

Introduction

Highly active photocatalytic materials capable of converting solar energy, exploiting it for the degradation of organics, conversion of gases and liquids, and preparation of biofuels are under the spotlight of chemical engineering research. Among photocatalytic materials, nanostructured titanium dioxide (TiO₂) features unique photochemical properties, has low cost, is chemically stable and environmentally friendly.¹⁻⁷

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