

# EUROMAT 2011

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**SF2M**

Société Française  
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Associazione Italiana  
di Metallurgia

### Main Topics

**Functional Materials: Properties & Applications**

Magnetic Materials; Materials for Nanostructures; Functional Polymeric Materials; MEMS, NEMS and Devices

**Structural Materials: Properties & Applications**

Advanced Metals; Advanced Ceramics; Hybrid and Composite Materials; Advanced Concepts in Structural Materials

**Materials Processing**

Solidification and Solid State Transformations; Joining; Powder Routes: from Synthesis to Materials; Coatings and Surface Engineering; New concepts in Materials Processing

**Characterisation and Modeling**

Microstructural Characterisation Techniques; Mechanical Characterisation Techniques; Materials Modeling on all Length Scales

**Energy and related Applications**

Energy Production, Transportation and Management; Materials for Energy in a Sustainable Society; Materials for Transportation

**Health Care Applications**

Materials for Health Care Applications

Education



Topic Area	C Processing	
Topic	C3 - Powder routes : from synthesis to materials	C31-P-1-25
Symposium	C31 - Powder Synthesis and Processing	1016
Session		

**Evaluation of the precursor and hydrothermal conditions to obtain titanate structures applied to the photodegradation of rhodamine B**

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**Abstract**

Titanate structures can be obtained by hydrothermal method in highly alkaline conditions. Most of the works presents only TiO<sub>2</sub> as precursor and highly alkaline conditions (strong bases at concentrations ranged from 5 to 10 mol.L<sup>-1</sup>) [1]. On the other hand, there is a lack of studies that examine other precursors in order to obtain titanates at soft conditions. Then this study presents the synthesis of titanates by hydrothermal route using 4 precursors, 2 commercial precursors (TiO<sub>2</sub> and titanium isopropoxide) and 2 peroxo complexes of titanium.

The peroxo complexes were obtained through decomposition of metallic titanium and titanium Isopropoxide according to previous works [2,3] resulting to the precursors named as TiO/peroxo complex of titanium and Isopropoxide/peroxo complex of titanium, respectively. After synthesis of precursors, it was made the hydrothermal treatment (200°C/2 h) in KOH solution at 0.01, 0.1 and 1 mol.L<sup>-1</sup>. Then, dialysis was performed to cleanse the obtained material that was lyophilized to obtain the powder for further characterizations. The materials were characterized by X-ray diffraction, surface area, scanning electron microscopy and their photocatalytic potential was evaluated for the degradation of rhodamine B through monitoring the dye concentration with UV-Vis spectrometry. The results showed that the precursors of peroxo complexes of titanium and titanium isopropoxide produced titanate sheets in less alkaline conditions than previous works. In 1 mol/L-1 concentration all of precursors resulted in the TiO<sub>2</sub> anatase formation after hydrothermal treatment being obtained a phase mixture of anatase-titanate for the Isopropoxide/peroxo complex of titanium. In 0.1 mol.L-1 concentration, the hydrothermal treatment resulted in the titanate formation for all precursors, except for TiO<sub>2</sub> that did not result in the formation of titanate in the studied conditions. Also, the titanates showed low photoactivity compared to anatase phases and the material obtained using Isopropoxide/peroxo complex of titanium at 0.01 mol.L-1 showed high photoactivity. This high photoactivity can be attributed the presence of the anatase-titanate heterojunction.

**References**

- 1.D.L. Morgan et al. Chem. Mater. 2008, 20, 3800.
- 2.C. Ribeiro et al. Chemistry (Weinheim) 2009, 15, 2217.
- 3.C.Ribeiro et al. J. Phys. Chem. C 2007, 111, 5871.