

PREPARATION OF MESOPOROUS TiO₂ BY SOL-GEL AND HYDROTHERMAL METHODS

Carmen Lazau^{1*}, Corina Orha¹, Daniel Ursu¹, Mircea Nicolaescu², Melinda Vajda²

¹National Institute for Research and Development in Electrochemistry and Condensed Matter, no 144 A. Paunescu Podeanu Street, Timisoara 300569

²“Politehnica” University of Timisoara, P-ta Victoriei, No. 2, Timisoara

e-mail: carmen.lazau@google.com

Abstract

Over the last years, there has been increasing interest in the application of TiO₂ with nanosized powders or mesoporous structure for gas sensing, photocatalysts, photoelectrodes, and solar energy conversion. In these applications, the control of morphology, particle size, distribution, phase composition, and porosity of TiO₂ is a primary factor in determining the properties of the final materials.

Mesoporous TiO₂ has a large surface area because of its confined porous structure and high surface to volume ratio, and also it should have a higher photocatalytic activity, because of the improved access to the active sites of TiO₂ [1].

To prepare TiO₂ mesoporous nanoparticles, is not such a simple work, because the raw materials, obtaining materials conditions such as the temperature, stirring rate, ionic strength, acidity, reactant ratios, and the temperature calcination influence their formation. Mesoporous TiO₂ nanoparticles can be prepared through a few methods, like hydrothermal synthesis, evaporation-induced self assembly, precipitation reaction, or the sol-gel process [2].

In this study, we report the preparation and characterization mesoporous TiO₂ by sol-gel and hydrothermal methods using hexadecylamine and Pluronic 127 like surfactant-template. The materials were characterized by X-ray diffraction (XRD), scanning electron microscopy (SEM) and BET.

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References

- [1] Dong Suk Kim, Seung-Yeop Kwak, Applied Catalysis A: General 323 (2007) 110–118
- [2] Rong Fu, Qianqian Yin, Xiaoling Guo, Xing Tong, Xiangdong Wang, Res Chem Intermed DOI 10.1007/s11164-017-2999-z