

Preparation of Ag modified TiO₂ nanofibers and their photocatalytic activity

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Nanosize TiO₂ is one of the most popular research object for preparation of active photocatalysts for solving environmental and energy problems. Unfortunately pure TiO₂ is active only in UV light irradiation, so it has to be modified to activate it in visible light as the sun light contains about 45% visible light and only 5% UV light.

In the present work formation of active TiO₂ nanoparticles in microwave synthesis and their modification with silver were studied. TiO₂ P25 nanopowder and 10M KOH solution were used as raw materials. Microwave assisted synthesis method permitted to obtain TiO₂ nanofibres with a diameter of 5nm and a specific surface area in the range of 70 - 150m² / g (Fig.1, 2). In order to modified TiO₂ nanofibers with silver two different methods were used. In the first method nanofibers were stirred in AgNO₃ solution under UV irradiation. Chemical deposition method was used as second method. AgNO₃ was used as silver source and formaldehyde was used as reducing agent.

Photocatalytic activity was determined by degradation of the methylene blue solution under UV and visible light irradiation. The obtained samples showed up to 38% higher photocatalytic activity in UV irradiation and up to 10% in visible light with respect to pure TiO₂ nanofibers. Samples prepared by using chemical deposition method were with higher photocatalytical activity than samples prepared by using UV irradiation method.

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References

1. Z. Guo, C.Chen,Q. Gao, Y. Li, L. Zhang. Mat.Lett. 137, 464-467 (2014)

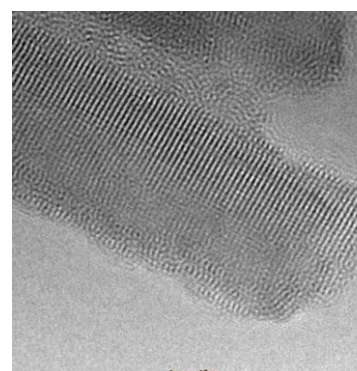


Fig.1 TEM micrograph of individual TiO₂ nanowire (scale 2nm).

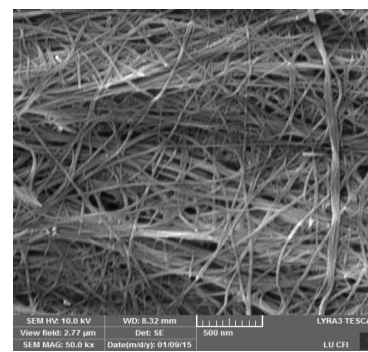


Fig.2 SEM micrograph of TiO₂ nanofibers.