

Conversion of Methane to Methanol using WO₃/TiO₂ Porous Photocatalyst

Marcos Yovanovich, Araceli Jardim da Silva, Rodrigo F. B. de Souza, Valter Ussui[†],
Almir Oliveira Neto, Dolores R. R. Lazar^{*}

Instituto Pesquisas Energéticas e Nucleares - IPEN/CNEN-SP, Av. Prof. Lineu Prestes, 2242, Cidade Universitária, 05508-000, São Paulo, SP, Brazil

*E-mail: drlazar@ipen.br

[†] Note: This paper is dedicated to the memory of Prof. Valter Ussui who passed away on January 21, 2021.

doi: 10.20964/2021.07.65

Received: 14 March 2021 / Accepted: 8 May 2021 / Published: 31 May 2021

The conversion of methane into methanol is one of the great challenges in the photocatalysis. In this investigation WO₃/TiO₂ photocatalysts was synthesized by sodium borohydride (NaBH₄) method. The tungsten concentration was studied in the range of 5 to 20 atomic ratio. XRD results revealed a TiO₂ anatase phase and WO₃ peaks near the background noise. However, WO₃ presence has been highlighted by Raman spectroscopy, indicating the existence of both orthorhombic and amorphous phase. The photocatalyst experiments showed that all materials enable the methanol production in UVC irradiation, and only the materials with WO₃ content produced the alcohol in white light irradiation. The high conversion was observed for WO₃₍₁₀₎/TiO₂₍₉₀₎ with 3.5 mmol h⁻¹. The conversion of methane to methanol was most promising using WO₃₍₁₀₎/TiO₂₍₉₀₎ due high conversion and no other products observed in FTIR spectra.

Keywords: methane into methanol, WO₃/TiO₂ photocatalysts, photo-reactor.

[FULL TEXT](#)

© 2021 The Authors. Published by ESG (www.electrochemsci.org). This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).