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www.elsevier.com/locate/talanta

PII: S0039-9140(18)30137-1
DOI: https://doi.org/10.1016/j.talanta.2018.02.028
Reference: TAL18347

To appear in: *Talanta*

Received date: 24 October 2017
Revised date: 7 February 2018
Accepted date: 7 February 2018

Cite this article as: Ai-Lin Liu, Zhong-Qiu Li, Zeng-Qiang Wu and Xing-Hua Xia, Study on the photocatalytic reaction kinetics in a TiO_2 nanoparticles coated microreactor integrated microfluidics device, *Talanta,* https://doi.org/10.1016/j.talanta.2018.02.028

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ABSTRACT

For study of the photocatalytic reaction kinetics in a confined microsystem, a photocatalysis microreactor integrated on a microfluidic device has been fabricated using an on-line UV/vis detector. The performance of the photocatalysis microreactor is evaluated by the photocatalytic degradation of Rhodamine B chosen as model target by using commercial titanium dioxide (Degussa P25, TiO_2) nanoparticles as a photocatalyst. Results show that the photocatalytic reaction occurs via the Langmuir-Hinshelwood mechanism and the photocatalysis kinetics in the confined microsystem ($r = 0.359\ min^{-1}$) is about 10 times larger than that in macrosystem ($r = 0.033\ min^{-1}$). In addition, the photocatalysis activity of the immobilized TiO_2 nanoparticles in the microreactor exhibits good stability under flowing conditions. The present microchip device offers an interesting platform for screening of photocatalysts and exploration of photocatalysis mechanisms and kinetics.