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Study on the photocatalytic reaction kinetics in a TiO₂ nanoparticles coated microreactor integrated microfluidics device

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1 **Study on the photocatalytic reaction kinetics in a TiO₂ nanoparticles**
2 **coated microreactor integrated microfluidics device**

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9 **ABSTRACT**

10 For study of the photocatalytic reaction kinetics in a confined microsystem, a
11 photocatalysis microreactor integrated on a microfluidic device has been fabricated
12 using an on-line UV/vis detector. The performance of the photocatalysis microreactor
13 is evaluated by the photocatalytic degradation of Rhodamine B chosen as model target
14 by using commercial titanium dioxide (Degussa P25, TiO₂) nanoparticles as a
15 photocatalyst. Results show that the photocatalytic reaction occurs via the
16 Langmuir-Hinshelwood mechanism and the photocatalysis kinetics in the confined
17 microsystem ($r = 0.359 \text{ min}^{-1}$) is about 10 times larger than that in macrosystem (r
18 $= 0.033 \text{ min}^{-1}$). In addition, the photocatalysis activity of the immobilized TiO₂
19 nanoparticles in the microreactor exhibits good stability under flowing conditions.
20 The present microchip device offers an interesting platform for screening of
21 photocatalysts and exploration of photocatalysis mechanisms and kinetics.

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