View metadata, citation and similar papers at core.ac.uk
brought to you by CORE
provided by Universidade do Minho: RepositoriUM

Poster19

Assessment of ciprofloxacin photocatalysis by-products toxicity with *Vibrio fischeri*

A.R.Silva[1,2], S. Teixeira[3], P.M. Martins[1,2], L.Periera[2], M. Alves[2], K.Keuhn[3], G. Cuniberti[3,4,5] and S. Lanceros-Mendez[1*]

[1]Centro/Departamento de Física, Universidade do Minho, 4710-057 Braga, Portugal
[2] Centro de Engenharia Biológica, Universidade do Minho, 4710-057 Braga, Portugal
[3]Institute for Materials Science and Max Bergmann Center of Biomaterials, TU Dresden, 01062
[4]Dresden, Germany Dresden Center for Computational Materials Science (DCCMS), TU Dresden, 01062 Dresden, [5]Center for Advancing Electronics Dresden, TU Dresden, 01062 Dresden, Germany

*Corresponding author: pamartins@fisica.uminho.pt

The presence of pharmaceuticals in water has become a large concern due to the potential negative effects on humans and aquatic ecosystems. From these pharmaceuticals, antibiotics represent a serious problem since their overuse and misuse may lead to adverse environmental effects, in particular, toxicity to microflora and fauna and potential negative effects to humans [1]. Photocatalysis has become attractive to promote the degradation of contaminants in the aquatic environment since it allows their rapid and efficient removal from water, transforming them into by-products [2]. In order to evaluate toxicity of these by-products, several bio tests using bacteria (*Vibrio fischeri*) and algae (*Daphnia spp.*), among others, have been used [3]. In the present work a photocatalytic systems using commercial TiO_2 and ZnO nanoparticles in suspension was used to degrade ciprofloxacin under UV radiation. Samples were withdraw over time in order to monitor degradation and toxicity. The luminescence of the bacteria *Vibrio fischeri* was used to test the toxicity of ciprofloxacin intermediate compounds, produced during the photocatalysis process. If a substance is toxic towards these bacteria, their normal luminescence decreases, as a consequence of a decreasing bacteria viability. Results (Figure 1) indicate that samples without ciprofloxacin degradation (t=0), in contact with bacteria (for 35 min), result in a higher luminescence than with completely degraded ciprofloxacin (t=15min). These results indicate that by products are responsible for low bacteria viability.

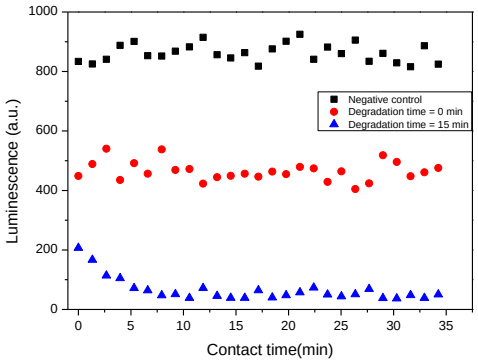

Figure 1 – Luminescence of bacteria during 35 minutes of contact with negative control samples and ciprofloxacin degradation samples at t=0 and t=15.

Acknowledgments:
This work was supported by FEDER through the COMPETE Program and by the Portuguese Foundation for Science and Technology (FCT) in the framework of the Strategic Project PEST-C/FIS/UI607/2011 and project PTDC/CTM-NAN/121038/2010. P. M. Martins thanks FCT for grant SFRH/BD/98616/2013.

References:

1. Homem, V. and Santos, L., Journal of Environmental Management, 92 (2011) 2304-2347.
2. Fujishima, A., Rao, T. N., and Tryk, D., Journal of Photochemistry and Photobiology C: 1 (2000) 1–21.
3. M. Heinlaan, A. Ivask, I. Blinova, H.-C. Dubourguier, and A. Kahru, Chemosphere, vol. 71, no. 7, pp. 1308–16, Apr. 2008.