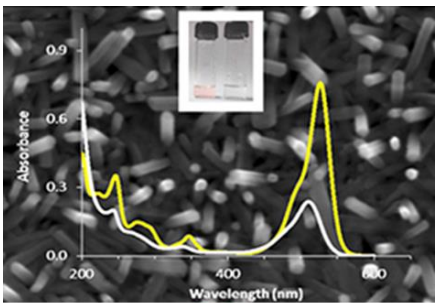
# New materials for wastewater treatment





**Hierarchically grown $CaMn_3O_6$ nanorods by RF magnetron sputtering for enhanced visible-light-driven photocatalysis**, B. Barrocas, S. Sério, M. E. Melo Jorge, J Phys Chem C, 2014, 118, 24127−24135.

**Annealed Ti/Zn-$TiO_2$ nanocomposites tested as photoanodes for the degradation of Ibuprofen,** A. Gomes, T. Frade, K. Lobato, M. E. Melo Jorge, M. I. da Silva Pereira, L. Ciriaco, A. Lopes, J. Solid State Electr, 2012, 16, 2061-2069.

The removal of organic pollutants and pharmaceutical drugs from wastewater is currently one of the major concerns in environmental control. In order to address these problems, considerable efforts have been devoted to develop techniques more effective than the conventional processes to eliminate these pollutants.

Removal of organic pollutants:

For the first time the growth of immobilized $CaMn_3O_6$ nanorods (NRs) by RF magnetron sputtering onto quartz glass substrates was carried out. It was found that the immobilized $CaMn_3O_6$ NRs exhibit much higher photocatalytic activity than the $TiO_2$ films on the degradation of Rh6G under visible light irradiation. This study further revealed that the high catalytic efficiency of $CaMn_3O_6$ NRs probably arises as a result of the complex interaction between the double chains of edge-shared $MnO_6$ octahedra, the mixture between $Mn^{3+}$ and $Mn^{4+}$, and/or the higher surface-to-volume ratio (surface morphology) afforded by the nanorods geometry, together with a process of dye self-sensitization. Furthermore, it is reported here the importance of this new nanostructured material in obtaining active visible-light photocatalysts.

Pharmaceutical drugs degradation:

Photoactive annealed Ti/Zn-$TiO_2$ electrodes were successfully prepared and used for the first time on the photoelectrochemical degradation of Ibuprofen. We demonstrated that Ibuprofen was efficiently degraded probably due to high area of the films, as a consequence of their morphology: ZnO needle-shaped grains.