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Wastewater disinfection and organic microcontaminant removal
by solar photo-Fenton

CIESOL is a joint research center between the University of Almeria (UAL) and the Plataforma Solar de Almeria (PSA) and has been operating since January 2006. The main research lines are solar processes for: Water treatment (photochemistry, Environmental chemistry, Photosynthesis, Desalination) and Energy management (Process modelling, Automatic control, Building comfort assessment, Solar cooling, Solar resources assessment).

Among Advanced Oxidation Processes, AOPs, solar photo-Fenton is especially interesting since it is much faster than TiO_2 photocatalysis for the removal of persistent organic contaminants and bacteria inactivation in complex media. Furthermore, to reduce costs, low-cost reactors such as Raceway Pond Reactors (RPRs) are used. These reactors are efficient for bacterial inactivation in real WWTP effluents as well as for the removal of contaminants of emerging concern, CECs, by solar photo-Fenton.

The short treatment times make it necessary to move from batch wise operation towards continuous flow operation for disinfection and CEC removal. The estimated treatment cost varies between 0.12 €/m³ and 0.49 €/m³ regarding the operating conditions. These results pave the way to the implementation of the solar photo-Fenton process on a demonstrative scale.