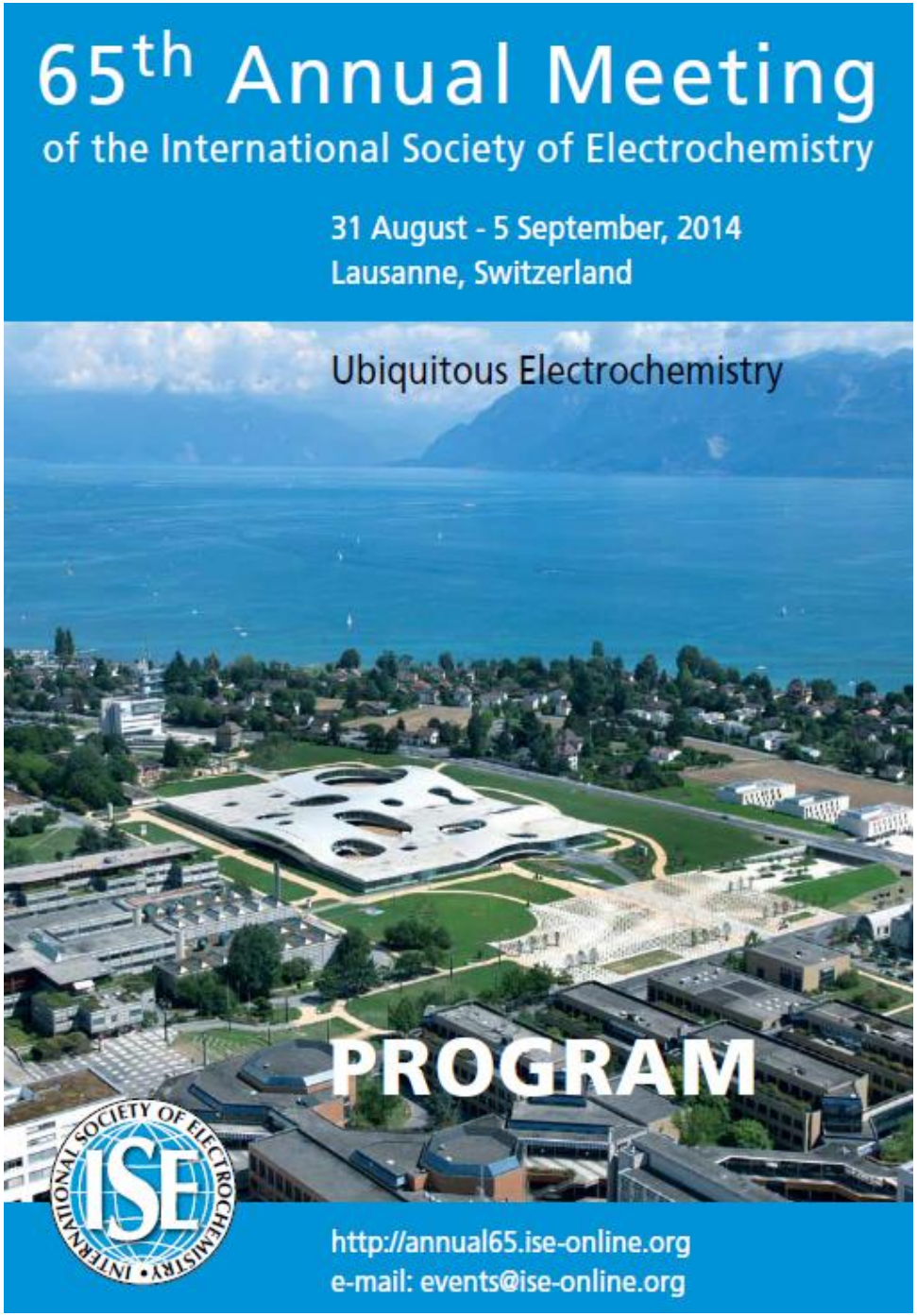

Abatement of Acid Orange 7 in water by different electrochemical approaches

Onofrio Scialdone, Adriana D'Angelo, Simona Sabatino, Alessandro Galia
Università degli Studi di Palermo
Viale delle Scienze, 90100 Palermo
onofrio.scialdone@unipa.it

Very large amounts of synthetic dyes are discharged in the environment from industrial effluents [1]. Due to their large-scale production and extensive application, synthetic dyes can cause considerable nonaesthetic pollution and are serious health-risk factors [2]. Dyes are commonly classified from their chromophore group. The majority of these compounds consumed at industrial scale are azo (–N=N–) derivatives that represent more than 50% of the all dyes used in textile industries, although antraquinone, indigoide, triphenylmethyl, xanthene, sulphur and phtalocyanine derivatives are frequently utilized [3].
Since dyes usually present high stability under sunlight and resistance to microbial attack and temperature, most of these compounds are not degradable in conventional wastewater treatment plants. The research of powerful and practical treatments to decolorize and degrade dyeing wastewaters to decrease their environmental impact has then attracted increasing interest over the past two decades. Electrochemical methods are considered to be among the more efficient Advanced Oxidation Processes (AOPs) for the removal of dyes [2]. The main electrochemical procedures utilized for the remediation of dyestuffs wastewaters are electrocoagulation (EC), direct electrochemical oxidation (EO) with different anodes, indirect electro-oxidation with active chlorine (IOAC) and Electro-Fenton (EF) [2]. The azo dye Acid Orange 7 (AO7), also called Orange II, was often chosen as model compound to evaluate promising approaches because, being a simple molecule, it is very useful as test and since it is widely used in paperboard industries, for coloration, and in wool textile dyeing. In our lab, the electrochemical abatement of AO7 was carried by a large variety of electrochemical processes including direct anodic oxidation, electro-Fenton, oxidation by electrogenerated active chlorine and coupled processes and using very different devices such as conventional lab cells, microfluidic reactors, reverse electrodialysis cells and microbial fuel cells. Main results achieved during this investigation were here reported.

[1] T. Robinson, G. McMullan, R. Marchant, P. Nigam, Bioresour. Technol. 77 (2001) 247–255.
[2] C. A. Martínez-Huitle, E. Brillas, Appl. Catal. B: Environ 87 (2009) 105–145.
[3] E. Forgacs, T. Cserhati, G. Oros, Environ. Int. 30 (2004) 953–971; G.M. Atenas, E. Mielczarski, J.A. Mielczarski, J. Colloid Interf. Sci. 289 (2005) 171–183.