

New electrochemical processes for energy and the environment: foreword

In the search of novel applications of electrochemical technology for the effective remediation of environmental problems or more efficient transformation and/or storage of energy, fundamental knowledge plays a very important role. Also, new materials can be key elements in this search. In any case, the detailed knowledge of the properties of electrode materials, and how these properties affect the mechanism, selectivity, and efficiency of the electrochemical processes in which they participate can help to optimize the existing applications and to discover new ones. Well-known examples of the large advancements associated to the technological development of new materials in electrochemistry include the application of diamond electrodes for the treatment of wastewater and the bipolar and the composite membranes specially designed for many environmental and energy applications, not forgetting the new electrolyte formulations for redox flow batteries, the new catalysts for electrolyzers and fuel cells, etc.

In this context, Divisions 5 and 7 of ISE clearly recognized the necessity to support the research in this areas, and, for this reason, designed the 25th Topical Meeting of ISE, entitled New Electrochemical Processes for Energy and the Environment, appointing a group of very active members in the field for the organizing committee. The main objective of the meeting was to bring together scientists from all around the world in both fundamental research and technological applications for boosting the state of the art of these electrochemical processes up to a new level and helping in the development of new ones capable of facing the huge demands of our society in relation with sustainability.

Among the hundreds of communications presented, several were selected and invited to contribute to this special issue of *Electrochimica Acta*. After the reviewing process, these

26 papers that appear in this collection were accepted. They reflect some of the new visions presented in the meeting, starting with fundamental issues regarding the oxygen reduction reaction, continuing with the challenging CO₂ reduction reaction, and the development of new materials for electrochemical applications and concluding with papers focusing on exciting energy and environmental applications of the electrochemical technology, the core of the Meeting.

Three parallel sessions made the meeting very dynamic. Outstanding keynote lectures by professors Feliu (Scaling up and down heterogeneity in Electrocatalysis), Roth (Material concepts for vanadium redox flow batteries), Zhou (New Electrodes for Efficient Electrochemical Advanced Oxidation Processes) and Roldan (Tuning CO₂ electroreduction selectivity by rational catalyst and electrolyte design) set the tone of the meeting. Top invited lecturers also contribute strongly to the success of the scientific level of the event. In addition, the Workshop of Sustainable Electrochemical Technologies, a parallel event co-organized by the Spanish Network of Energy & Environmental Applications of Electrochemistry Technology (E3Tech) (<https://rede3tech.org/>) was held within the meeting framework. This latter event aimed to put in contact scientists with companies trying to reach synergistic collaborations.

The meeting took place in Spain, 11 years after the successful 59th Annual Meeting of the Society that took place in 2008. Previous meetings in Spain also included a Spring meeting in Alicante in 2003 and an Annual Meeting in 1985 in Salamanca. Long time between events! For this reason, the Spanish electrochemical community was very excited and motivated to organize a new event that congregated again the best electrochemists from all around the world in our country. The active and enthusiastic implication of the Spanish ISE group contributed to the success of the Topical Meeting. For the occasion, another historical and touristic city was selected: Toledo, special in its

details, history, culture, and charm, generated, for sure, a very friendly atmosphere for discussions. The meeting was hosted by Universidad of Castilla La Mancha. This university has two campuses in Toledo, one in the downtown and other in the riverside. This later campus (sized for 4000 students) is very suitable for a scientific meeting and the university has the experience in hosting those kinds of events therein. It was a former weapon factory from the XVIII to the XX century with singular buildings by Sabatini, which were restored by the University twenty years ago and are very good examples of industrial architecture.

But not only the place of the event: the whole city was involved in the success of the meeting by combining science with social activities. Toledo is one of the Spanish most beautiful cities and it is declared as a national heritage site. It was once the Spanish capital under the Visigoths, from year 567 to 711, and again from 1085 to 1561, when Felipe II moved the Court of Spain to Madrid. It is still the religious center of Spain. Locals often refer to Toledo as 'La Ciudad Imperial' (The Imperial City) or the “three culture city”. The whole historic city of Toledo was declared a World Heritage Site by UNESCO in 1986, and it is located on a rocky headland, bordered by the river Tajo in the very heart of Spain, just 70 kilometers from the capital, Madrid. For centuries, the capital of Spanish region Castile-La Mancha has been able to preserve an unrivaled, thousand-year-old urban, architectural, and artistic heritage. Churches, synagogues, mosques, convents, city walls, bridges, towers and an endless amount of cultural and artistic possibilities held in their buildings make Toledo a museum waiting to be discovered. Three cultures from three single-faith religions - Muslim, Hebrew, and Christian - left their imprints on this sad rock and cradle of civilizations - as Cervantes wrote - embracing the Tajo, witness to the mark of all the peoples of the Iberian Peninsula.

Weather joined us and lunch and coffee breaks took place in the gardens of the Campus allowing social and scientific discussion in the warmest environment. Guided visits to the city and the historical monuments and other organized social events were also successful and allow people to relax while discussing science.

Chairs of the event were Professors Enrique Herrero and Manuel A. Rodrigo and they were actively supported by the Local Organizing Committee which included many researchers and students, especially from UCLM, which did their best to contribute to the success of the event. We hope that this special issue, which is a summary of the views of this meeting, will be interesting and stimulating for the whole electrochemical community and especially to those whose work is focused on New Electrochemical Processes for Energy and the Environment.

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Image from the Opening Ceremony. From left to right: Chair of the Local Organizing Committee (Prof. Cañizares), the President of ISE (Prof. Tian), The Toledo Campus Vice-rector of UCLM (Prof. Guadalmillas) and the Chairs of the Scientific Committee (Prof. Herrero and Prof. Rodrigo).



One of the keynote lecturers in action: Prof. Roldan during her talk



Reseachers attending one of the lectures of the event



Not only science... but also friendly discussion during the meals



Taking a breath after scientific sessions



Gala dinner



Social activities: guide visit to monuments