



Towards pollution-free green electrochemical processes for sustainable development

Christopher M.A. Brett

*Department of Chemistry, Faculty of Sciences and Technology, University of Coimbra,
3004-535 Coimbra, Portugal
E-mail: cbrett@ci.uc.pt*

Electrochemical processes are inherently clean in nature and are inherently linked to green chemistry principles and are also important tools in the goal of sustainable development. Electrode surfaces enable control of the energy of transferred electrons in oxidation and reduction and thence the mechanism of reaction of oxidation or reduction, which can be superior to those of other catalysts. Different types of electrode material can lead to further selectivity. As well as energy harvesting (e.g. solar cells) and energy storage, examples will be given which include the production of chemicals by electrolysis and electrosynthesis, water purification, contaminant removal, and protection against corrosion. A new possibility is the use of deep eutectic solvents (DES), green and promising alternatives to non-aqueous solvents and room temperature ionic liquids. At the same time, electrochemistry can be used for selective on-line process monitoring and for measuring traces of known and emerging pollutants, of recognised and increasing concern. This will be illustrated with recent examples.

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