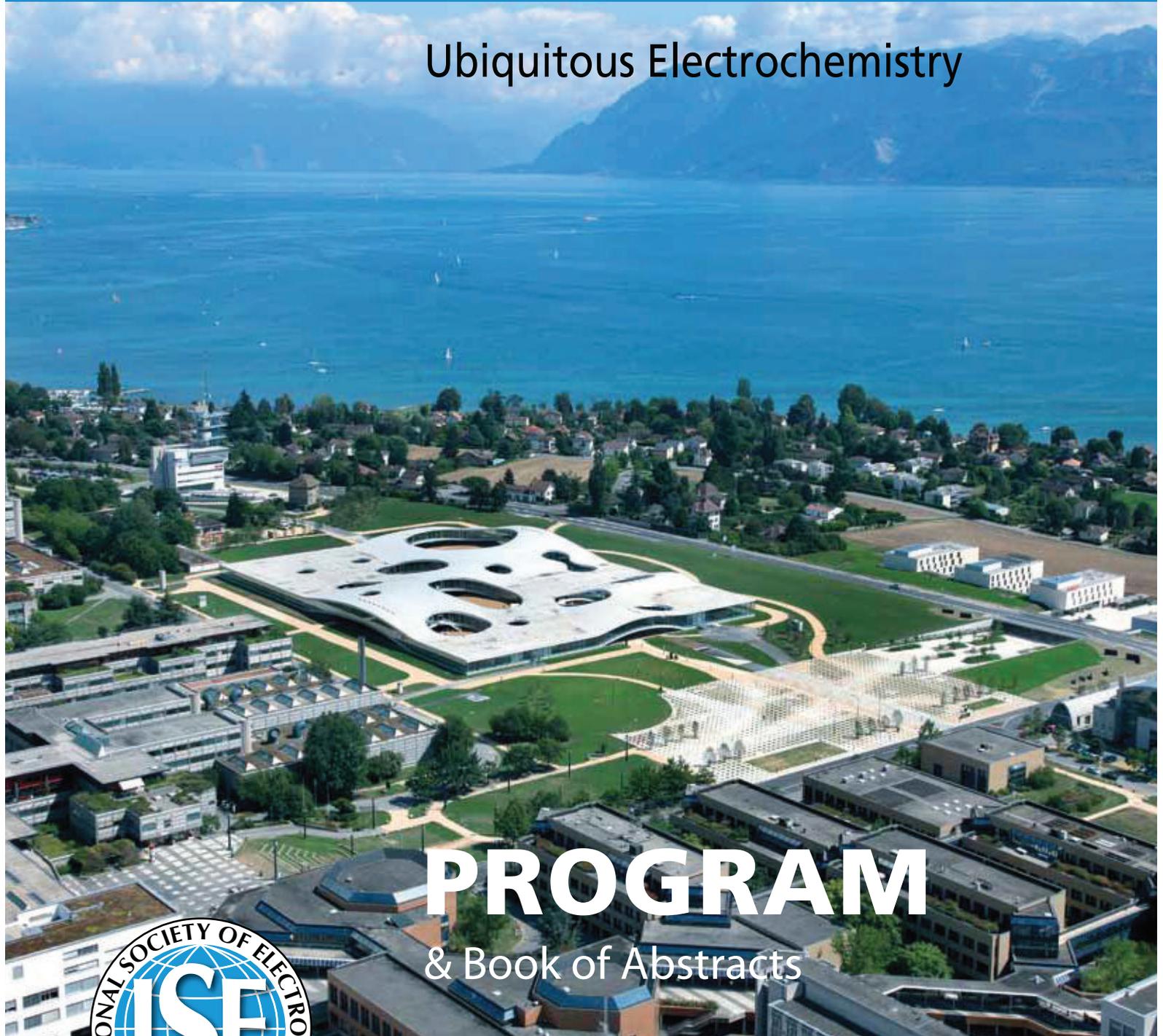


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Towards Inherently Chiral Ionic Liquids: Molecular Design Strategies and Electrochemical Properties

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Chiral Ionic Liquids (CILs) constitute a class of chiral solvents of steadily increasing importance in the last years; they are employed *inter alia* as chiral solvents for asymmetric synthesis and stereoselective polymerization, as chiral phases in gas chromatography and as chiral shift reagents in NMR spectroscopy. Although their application to electrochemical processes is a field still requiring exploration, they should have a huge impact for instance in asymmetric electropolymerizations and in regioregular electrochemically activated polymerizations, as well as in preparative electrosynthetic processes of chiral compounds.

The current general design of CILs follows rather intuitive strategies. The use of a chiral anion (e.g. from lactic acid, α -aminoacids, 10-camphorsulfonic acid, 1,1'-binaphthylphosphoric acid) is a simple but scarcely innovative strategy. More possibilities are afforded by the chiral cation approach; in this case a wide range of building blocks have been so far explored to confer chirality, from the classical 1-phenylethyl group to derivatives of tartaric acid, pinene, myrtenol, citronellol, menthol, carvone, etc.

Our group has recently proposed electroactive thiophene-based polyconjugated films of unprecedented chirality manifestations and enantioselectivity^[1] based on the concept of the *whole* electroactive backbone coinciding with the stereogenic element, consisting in a tailored torsion induced by an atropisomeric bithiophene scaffold. Now we are trying to apply the same "inherent chirality" approach to the development of inherently chiral ionic liquids, hopefully endowed with high enantioselectivity, like the formerly developed inherently chiral electrodes. An overview will be given of the first structures obtained and of their electrochemical properties. The new molecules are based on cations including different atropisomeric bis-benzimidazolium groups acting as the stereogenic element, responsible for both the molecular chirality and the IL properties of the material, modulated by the number, position and length of alkyl chain substituents.

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[1] F. Sannicolò, S. Arnaboldi, T. Benincori, V. Bonometti, R. Cirilli, L. Dunsch, W. Kutner, G. Longhi, P.R. Mussini, M. Panigati, M. Pierini, S. Rizzo, *Angew. Chem. Int. Ed.* **2014**, *53*, 2623-2627.