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《第十五届全国有机电化学与电化学工业学术会议》 专辑序言

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有机电化学是有机化学和电化学技术相结合的一门科学. 与传统的有机合成方法相比, 有机电化学合成无需使用有毒或危险的氧化剂或还原剂、具有反应选择性高、反应条件温和等优点, 因而在药物、香料、染料和化纤等精细化学品的合成中得到广泛应用. 尤其是近年来随着环境污染的加剧, 有机电合成作为一种绿色的化学合成技术受到了化学工业界的密切关注. 从本质上讲, 有机电化学以电子为试剂, 通过电子的得失实现物质的还原和氧化, 即从工艺本身消除了污染的形成, 是名符其实的“绿色可持续化学”.

1965 年美国孟山都(Monsanto)公司成功开发了丙烯腈电解合成己二腈的工业生产技术. 年产二万吨的大型工业装置运行获得成功后, 有机电合成技术引起了工业界和科学界的极大兴趣, 自此有机电化学的研究获得了快速的发展. 我国有机电化学的研究也始于此时. 1966 年, 上海天原化工厂和江苏省化工研究所开始了溶液法丙烯腈电解合成己二腈的研究. 自上世纪八十年代以来, 我国有机电化学基础研究出现了飞速的发展, 也引起了国内工业界的极大关注, 激发了大专院校和科研院所的研究热情, 涌现出一批应用成果. 草酸电解还原生成乙醛酸、呋喃电解氧化合成 2,5-二甲氧基-2,5-二氢呋喃、电解生产二茂铁、胱氨酸电化学还原合成 L-半胱氨酸等一批研究成果实现了工业应用. 现在, 四甲基氢氧化铵和四乙基氢氧化铵、四丙基氢氧化铵、四丁基氢氧化铵、丁二酸、L-半胱氨酸、高半胱氨酸等产品的生产已完全被电解法所取代, 四甲基氢氧化铵的年产量已达十万吨, 四乙基氢氧化铵和丁二酸的生成能力也达万吨级.

1986 年 5 月, 在南京召开了中国化学会有机化学专业委员会有机电化学专业组建组会议. 会议决定召开全国有机电化学会议, 并出版《有机电化学及工业通讯》. 第一、二、三届全国有机电化学会议分别于 1988、1990、1992 年在华东化工学院(现华东理工大学)成功举办. 每两年一届的学术讨论会至本届已经成功举办了十五次, 参会人数由最初的四五十人发展到现在的二百余人. 涉及领域也从最初的有机电氧化和电还原、电聚合及其工业转化中的电解槽、电极、电解液、隔膜的研究扩展至有机电化学基础研究、电化学合成、电催化、工业电化学、环境电化学、电极材料和电解槽设计、有机电分析等领域的基础研究和应用开发.

本次会议的主题是“强化电化学应用研究, 推动电化学工业发展”. 参加本次会议的代表共有 200 余人, 提交论文 118 篇. 其中大会报告 7 篇, 邀请报告 24 篇, 口头报告 18 篇, 墙报 64 篇. 为宣传我国有机电化学和电化学工业的进展, 促进国内外的交流, 《电化学》编辑部决定为本届会议出版一期专辑. 我们从中精选出 12 篇论文, 其中 5 篇综述论文, 7 篇研究论文, 涵盖有机电合成及机理、电镀、电分析、电极及有机电物电降解等领域. 希望借助本专辑的出版, 能使广大读者更深入地了解我国有机电化学和电化学工业的研究现状、研究趋势和存在的问题及挑战, 为该领域研究提供参考, 推动我国有机电化学和电化学工业的研究进一步发展.

在此, 特别感谢《电化学》编辑部特辟专辑报道本届参会的学术成果, 并对本专辑的所有作者、审稿人及编辑部工作人员的辛勤劳动表示衷心的感谢!

Preface

Organic ElectroChemistry (OEC) is an interdisciplinary of Organic Chemistry and Electrochemical Technology. Compared with conventional chemical synthesis, organic electrosynthesis utilizes none of toxic and/or dangerous redox reagents, and proceeds under mild conditions with better reaction selectivity, thereby, has been widely used in syntheses of fine chemicals including drugs, spices, dyes and synthetic fibers. With the increasing concern of environmental problems, more and more attention has been paid to organic electrosynthesis as a green chemical synthesis technology. During the electrochemical oxidation and reduction processes, electron acts as a reagent to remove from and add to the substrates. Without utilization of stoichiometric chemical reagents and without generating the associated waste products, organic electrochemistry in nature is regarded as the “green and sustainable” chemistry.

The “rational” era of OEC began in 1964, when Monsanto successfully developed the synthesis technology of adiponitrile electrochemically from acrylonitrile in the largest industrial plant with an annual output of twenty-thousand-ton. Thereafter, organic electrosynthesis technology had experienced rapid development. Around this time, scientists in China commenced with studies in organic electrochemistry. In 1966, the Shanghai Tianyuan Chemical Factory and Institute of Jiangsu Chemical Industry also explored electrosynthesis of adiponitrile in solvents. Since 1980s, much advance in basic researches of organic electrochemistry has been made, which attracted great attention from chemical industry. A variety of research findings emerged, part of which were put into industrial applications, such as electroreduction of oxalic acid to glyoxylic acid, electrooxidation of furan into 2,5-dimethoxy-2,5-dihydrofuran, electrosynthesis of ferrocene, and electroreduction of cystine to *L*-cysteine. Nowadays, the commercial productions of many chemicals, including tetramethyl ammonium hydroxide, tetraethyl ammonium hydroxide, tetrapropyl ammonium hydroxide, tetrabutyl ammonium hydroxide, succinic acid, *L*-cysteine, *DL*-homocysteine, have been completely replaced by electrochemical methods. Moreover, the output of tetramethyl ammonium hydroxide has reached up to a hundred thousand tons per year, as well as up to ten thousand tons per year for tetraethyl ammonium hydroxide and succinic acid.

In May 1986, Organic Chemistry Specialized Committee of Chinese Chemical Society held a meeting in Nanjing and decided to establish the Organic Electrochemistry Specialized Group. It was decided to organize “National Symposiums on Organic Electrochemistry” and to publish “Organic Electrochemistry and Industrial Communication” in the meeting. The first three national symposiums were held in the East China Institute of Chemical Technology (now the East China University of Science and Technology) in 1988, 1990 and 1992, respectively. This biennial symposium has been successively held for fifteen times. The number of participants increase from about fifty to two hundred recently. The scope of symposium topics ranges from organic electrooxidation, organic electroreduction, electropolymerization, and their industrial applications-involved electrolytic cell, electrode, electrolyte and separator membrane, to electrochemical fundamental research, electrosynthesis, electrocatalysis, electrochemical industry, environmental electrochemistry, electrode materials, electrolytic cell design, and electrochemical analysis.

The theme of this upcoming 15th National Symposium is: “Strengthening the applied research in electrochemistry and promoting the development in electrochemical industry”. There were 118 papers submitted from more than 200 participants. A total of 12 papers, including 5 reviews and 7 research papers, were selected for the publication in this special issue. We would like to take this opportunity to thank all the participants, authors,

reviewers, and editorial staffs of *Journal of Electrochemistry* for their excellent and professional contributions to this special issue.

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