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Guest editors Chao-Jun Li and Paul Anastas

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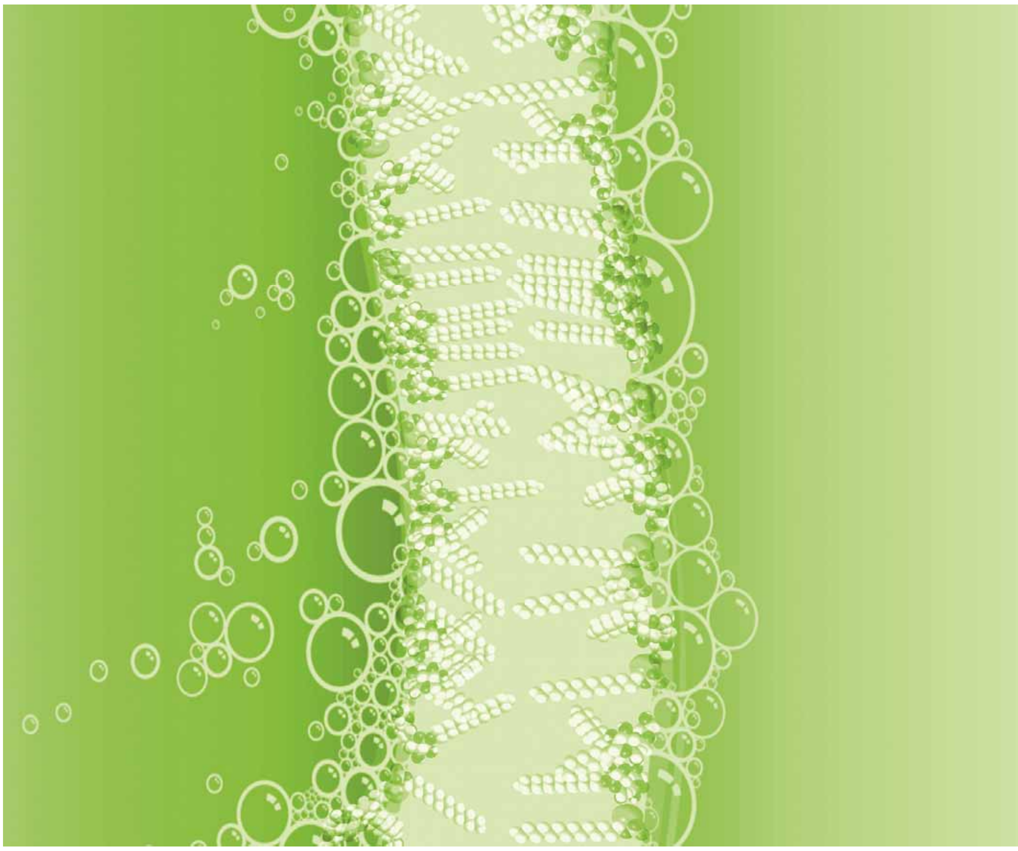

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EDITORIAL

Green Chemistry: present and future†

Chao-Jun Li[a] and Paul T. Anastas[b]

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Historically, one relies on Mother Nature to provide all the material needs of society. The development of modern chemistry has enabled us to transform our natural resources as well as to create new matter from existing ones to benefit society, which has greatly enriched our modern living and increased the quality of life. The heroic creativity, imagination, and innovation of chemists have touched every corner of our daily life from the colorful clothes that we wear to the ever changing electronic products that we "play" with, from the pharmaceutical agents to combat life threatening diseases to synthetic fertilizers to boost crop production for the world's needs, from the rapid growing number of skyscrapers to the ever increasing speed of transportation.

However, these enormous chemistry achievements have come with a price. Global natural resources are dwindling rapidly, the wastes accompanying the use and transformation of these resources as well as from chemical products having reached the end of their usefulness are accumulating quickly, some chemical products leading to unwanted properties despite all the good intentions of their creators. These "side" products of our chemical creations and innovations are increasingly causing environmental, health, and societal concerns. As a result, sustainability has become one of the greatest scientific challenges of our time (Fig. 1). The field of Green Chemistry, created two decades' ago, represents the key efforts to address such challenges from the most fundamental level by re-examining, redesigning, and recreating the scientific tools in producing, transforming, and utilizing of chemical products to increase the efficiency and efficacy while minimizing waste and harm. The objectives of this themed issue on Green Chemistry by some of the leading researchers on the subject are to reflect the progress, to celebrate the achievements, and to examine our needs in the field. This collection is only a small selective representation of a vast number of exciting developments in the field.

The paper by Gallezot (DOI: 10.1039/C1CS15147A) looks at using alternative chemical feed stocks from non-renewable to biomass while the paper by Darensbourg and Lu (DOI: 10.1039/C1CS15142H) examines the conversion of CO_2 into useful chemical products; the papers by Rogers (DOI: 10.1039/C2CS15311D), Li (DOI: 10.1039/C1CS15222J), and Poliakoff (DOI: 10.1039/C2CS15314A) summarize the creative uses of ionic liquids to process biomass, of water to simplify synthetic steps, and of supercritical CO_2 to enable chemical productions in flow; the paper by Sheldon (DOI: 10.1039/C1CS15219J) discusses reaction design to increase the synthetic efficiency; the papers by Dunn (DOI: 10.1039/C1CS15041C) and Jiménez-González (DOI: 10.1039/C1CS15215G) focus on process developments in chemical productions; the paper by Pelletier (DOI: 10.1039/C2CS15286J) presents examples of using enzymes for chemical transformations; the paper by Varma (DOI: 10.1039/C1CS15204A) looks at alternative energy input to facilitate chemical transformations; and finally, the paper by Beach (DOI: 10.1039/C1CS15217C) looks at greener molecular product design.

We hope that these representative developments will inspire further innovations in the production and utilization of chemical products for a sustainable future.

[a] *Department of Chemistry, McGill University, 801 Sherbrooke Street West, Montreal, QC H3A2K6, Canada. E-mail: cj.li@mcgill.ca*
[b] *US EPA, Washington DC, USA*

† Part of a themed issue covering the latest developments in green chemistry.

Fig. 1 A Periodic Table of Green Chemistry, devised by Samantha Tang, Richard A. Bourne, Richard L. Smith and Martyn Poliakoff. The blue and yellow "elements" highlight the ideas in the 24 Principles of Green Chemistry and Engineering IMPROVEMENTS PRODUCTIVELY, see S. Y. Tang, R. A. Bourne, R. L. Smith and M. Poliakoff, *Green Chem.*, 2008, **10**, 268–269.