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Progress in the kinetics and mechanisms of chemical reactions at the atomic and molecular levels. Thematic issue honouring François Garin

Progrès dans la cinétique et le mécanisme des réactions chimiques aux niveaux atomique et moléculaire. Numéro thématique en l'honneur de François Garin

Foreword

François Garin is a French chemist who began his career as a doctoral student of François G. Gault at the University of Strasbourg. Over the course of his career, he has been acknowledged as a leading researcher in the field of catalysis, an expert on catalysis using noble metals, and an outstanding teacher. François Garin is a brilliant, energetic, enthusiastic, creative, and visionary scholar and, with equal importance, a warm and thoughtful husband, father, and a friend to the many fortunate enough to know him.

This *very special issue* is devoted to the scientific work of François Garin, former head of the Laboratory on Materials, Surfaces and Processes for Catalysis–LMSPC (2004–2012) at the University of Strasbourg. This issue of *Comptes rendus Chimie* contains contributions from friends of François Garin as well as from participants in a symposium entitled *"Progress in the kinetics and mechanisms of chemical reactions at the atomic and molecular levels"* held at Strasbourg on 19 and 20 March 2013.

Catalysis has shaped our past and, *ipso facto*, will play a role in our future. Catalysis has served to improve quality of life and can be considered the main driving force in the advancement of civilization. Catalysis is critical to near-term impact areas, such as improved chemical process efficiency, environmental protection, pollution prevention, the reduction of harmful by-products in manufacturing, the development of new energy sources, and the synthesis of safe pharmaceuticals. It is also widely applied in waste-stream remediation and synthesis of new materials. Catalytic reactions occur on both large and small scales. Large-scale processes contribute to catalytic reactions, such as the molecular transport of reactants into and out of the pores of the catalyst. At the smallest level, reactions involve the exchange of atoms between different molecules and reactivity at the catalyst surface. The study of these reactions occurring at the atomic and molecular levels is the key to an increased understanding of heterogeneous catalysis. A central theme in the science of heterogeneous catalysis has been, and continues to be, chemical kinetics. Chemical kinetics is often treated as a secondary issue within the most important disciplines of chemical science. The study of kinetics – specifically, the study of mechanistic details – is extremely important in heterogeneous catalysis and has proven to be a powerful tool for understanding the varied fundamental factors underlying the development of science and technology of catalysis. Chemical kinetics provides the physical underpinnings of the chemical description of catalytic reactivity.

This thematic issue contains a diverse collection of papers that highlight the latest developments in chemical kinetics. It contains both review and research articles in this burgeoning field. The symposium honouring François Garin featured a number of presentations highlighting innovations in catalysis across many areas, including catalysis for energy and environmental applications, the preparation and characterization of ecological catalysts, and the elucidation of mechanistic details of catalytic reactions. Aspects of catalysis ranging from theoretical

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and fundamental to industrial ones are highlighted in this thematic issue. The breadth of the topics covered and the list of international authors in this issue highlight the diverse and important problems that François Garin addressed during his career.

This collection of papers is authored by a number of the speakers who attended the symposium as well as by those who were regretfully unable to attend it, but nonetheless wished to contribute.

We are privileged to have this opportunity to thank all of these authors for the time and effort involved in preparing these high-quality presentations and manuscripts. We also thank all of the reviewers who took time out of their demanding schedules to referee the papers in a timely manner.

We express our warm thanks to Mrs Fatima Messadi and Mrs Marie-Christine Brissot, who coordinated the handling and collecting of the manuscripts for this volume with a high degree of professionalism. We sincerely thank all of the editors of *Comptes rendus Chimie* involved in this thematic issue. Last, but certainly not least, we also express our gratitude to Professor Pierre Braunstein for the amiability and generosity shown in his acceptance of the editorial duties inherent to the present issue of the prestigious journal of the French Academy of Sciences, *Comptes rendus Chimie*.

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