Foreword

Chemical syntheses have contributed fundamentally to a broad variety of improvements in the human society from medicines to materials, several of those altering the course of history. As the importance of chemical synthesis became obvious, more people decided to pursue this growing field of science, which brought significant new developments into the theory and practice of chemistry including new applications for the preparation of chemical entities, inspiring even more extensive progress. At the beginning of the twentieth century, major breakthroughs were made in chemistry, from radioactivity to new elements or the three dimensional structure of carbon, leading to the golden age of chemical synthesis. These fundamental developments in chemistry and the increasing demand from the society provided the ultimate push to the establish a functioning chemical industry which could produce chemicals at large-scale, resulting in an instant impact on society; improving standards of living, life expectancy and many other societal benefits. However, the extensive developments brought several, serious, unintended problems. Although the original discoveries were made with good intentions, many went wrong and caused major industrial accidents, health or environmental issues. All these setbacks initiated a different way of thinking that led to the emergence of Green Chemistry. New green methods have been developed for the synthesis of chemical commodities, including active pharmaceutical ingredients (APIs), their building blocks and other fine chemicals. Heterocyclic compounds are likely the most important contributors to designing new drugs thus; their preparation is of utmost importance.

This book, entitled *Bioactive Five-Membered Heterocycles - Natural Products, Green Synthesis and Bioactivity* edited by Asit K. Chakraborti and Bubun Banerjee describes contemporary developments in the synthesis and use of five-membered heterocycles, one of the most prevalent building blocks for a variety of synthetic pathways. The book is intended for a broad audience including scientists in industry, and academia. The editors aimed to deliver a focused, state-of-the-art compilation of short reviews related to five-membered heterocycles. The book contains 19 chapters that provide a wide variety of insights into the chemistry of the target compounds, beginning with the description of naturally occurring bioactive five-membered heterocycles to introduce the topic of the volume. The introductory chapter is followed by a wealth of synthetic procedures, first in chapters that focus on the methods of their synthesis, including those activated by photochemical-, ultrasound- and microwave-assisted procedures. Similar method-driven chapters describe organocatalytic or, solvent-free protocols, and flow chemistry approaches. After the description of the application of the above variety of synthetic methodologies for the preparation of the five-membered heterocycles, the focus of the chapters shifts to individual target heterocycles. The list of the described scaffolds include pyrroles, indoles, oxazoles, isoxazoles, thiazoles, carbazoles, cyclopentene-decorated five-membered heterocycles, imidazo[1,2-*a*]pyridines, and selenium-decorated-five-membered heterocyclic compounds. The remaining chapters focus on the green

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synthesis of these heterocycles, including ascorbic acid-mediated synthesis, or photon- and electron-mediated alternative synthesis. The volume is closing by a chapter surveying the industrial applications of five-membered heterocycles.

Given the importance of the discussed heterocycles, I believe that this book will be a useful resource for synthetic research chemists working in green and sustainable synthesis, medicinal chemistry as well as industrial chemists working in process chemistry.

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