Preface

Heterocyclic N-oxides have gained in prominence in many areas of chemistry in the past several decades. In the area of organic synthesis, N-oxides have emerged as important substrates for regioselective functionalization of C–H bonds and cycloaddition reactions. There has also been a surge in interest in the catalytic, energetic, and photochemical properties of N-oxides. This volume seeks to provide an update on the recent advances in these important areas of chemistry of heterocyclic N-oxides. In the first chapter David E. Chavez gives an in-depth overview of the progress in the studies that aim to exploit the unique structural and electronic properties of N-oxides for the development of novel energetic materials (see chapter “Energetic Heterocyclic N-Oxides”). The moderate Lewis basicity of the oxygen atom in N-oxides has been employed in the design of catalysts for a variety of asymmetric transformations. Martin Kotora et al. examine the current state of the art in catalytic applications of heterocyclic N-oxides (see chapter “Pyridine N-Oxides and Derivatives Thereof in Organocatalysis”). N-Oxide functionality has emerged as a versatile directing group in the burgeoning field of C–H functionalization of N-heterocycles. David E. Stephens and Oleg V. Larionov survey recent advances in transition metal-catalyzed C–H functionalization of azine and azole N-oxides with the focus on transformations that retain the N-oxide functionality (see chapter “Transition Metal-Catalyzed C–H Functionalization of Heterocyclic N-Oxides”). Cycloaddition reactions of heterocyclic N-oxides play an important role in the synthesis of nitrogen-containing heterocycles. Rafał Loska discusses mechanisms and synthetic applications of cycloaddition reactions of azine and azole N-oxides (see chapter “Recent Advances in Cycloaddition Reactions of Heterocyclic N-Oxides”). The photoinduced transformations of heteroarene N-oxides have been intensively studied since the early days of heterocyclic chemistry. An excellent overview of the current status of photochemistry of N-oxides is given by James S. Poole (see chapter “Recent Advances in the Photochemistry of Heterocyclic N-Oxides and their Derivatives”).

The aim of this book is to shed light on some of the most exciting developments in the chemistry of heterocyclic N-oxides and to demonstrate the versatility of their
applications across a wide range of fields – from energetic materials to catalysis, and from photochemistry to organic synthesis.

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