

Preface

The last systematic description of heme peroxidases was published in 1999 by Brian Dunford, from the University of Alberta in Canada. The book *Heme peroxidases* covers discussion on three-dimensional structure, reaction mechanism, kinetics, and spectral properties of representative enzymes from bacterial, plant, fungal, and animal origin. Since 1999, vast information on basic but also applied aspects of heme peroxidases has been generated. We believe fusion of these two aspects will benefit research of those dedicated to development of biocatalytic process. The aim of this book is to present recent advances on basic aspects such as evolution, structure–function relation, and catalytic mechanism, as well as applied aspects, such as bioreactor and protein engineering, in order to provide the tools for rational design of enhanced biocatalysts and biocatalytic processes. The book does not include an exhaustive listing of references but rather a selected collection to enrich discussion and to allow envisioning future directions for research.

This book is organized in three parts. In Part I, current knowledge of structure and mechanism of peroxidases is covered. From the molecular phylogeny, going through the influence of structural factors over oxidative ability to the molecular mechanism of catalysis, the authors intend to provide an understanding of peroxidases at the molecular level. The understanding of the fundamental behavior of peroxidases will allow further adequation, design, and/or optimization of peroxidase-based catalysis to a particular process. In Part II, research on potential applications of peroxidases in several fields is presented and discussed. New processes for the fine chemicals industry, creation of new materials with novel properties, and biotransformation of compounds found in polluted water and soil are the topics included in this part. Finally, Part III presents the challenges that must be overcome in order to develop commercially feasible peroxidase-based industrial processes. As discussed in Chap. I, lowering the cost of the biocatalyst is essential; thus, low cost production and increased stability is discussed in this part. A compendium of useful information on peroxidases is to be found at the end of

the book, containing from biochemical properties such as molecular weight and isoelectric point to spectroscopic properties and kinetic data.

We would like to thank all the recognized experts that participated as authors in this book. We are also indebted to Prof. Michael A. Pickard, emeritus professor from the University of Alberta, who dedicated all his professional life to the study of peroxidases, and who made significant contributions in the areas of microbial metabolism and fungal enzymes, particularly with chloroperoxidase from *Caldariomyces fumago*, for helpful discussion and editorial assistance.

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