

Preface

This book is intended to describe the concepts, the up-to-date developments, and the perspectives of the field of nanozymes that has been rapidly growing over the past decades. Nanozymes are nanomaterials with enzymatic characteristics. As one of the most exciting fields, the research of nanozymes lies at the interface of chemistry, biology, materials, and nanotechnology.

It is counterintuitive to use nanomaterials to mimic natural enzymes since the two seem to be very different from each other. A careful comparison, however, would reveal that they share many features together. For examples, both of them have nanoscaled sizes, irregular shapes, rich surface chemistry, etc. It is these similarities that enable nanomaterials to imitate natural enzymes.

Due to the enormous amounts of literature published in the field, it is impossible to provide a comprehensive description of nanozymes here. Instead, it aims to provide a broad picture of nanozymes in the context of artificial enzyme research. Representative examples are discussed to highlight the nanomaterials with enzyme mimicking activities, their catalytic mechanisms, and their promising applications in various areas, ranging from biosensing and cancer diagnostics to tissue engineering and therapeutics.

Chapter 1 describes the brief history of nanozymes research in the course of natural enzymes and artificial enzymes research. It also compares nanozymes with natural enzymes and artificial enzymes to highlight their unique characteristics. Chapters 2–5 discuss the different nanomaterials used for mimicking various natural enzymes, from carbon-based (Chap. 2) and metal-based (Chap. 3) nanomaterials to metal oxide-based nanomaterials (Chap. 4) and other nanomaterials (Chap. 5). In each of these chapters, the nanomaterials' enzyme mimetic activities, the catalytic mechanisms, and the key applications are covered. In Chap. 6, the current challenges and future directions of nanozymes research are summarized, which if achieved will help to fulfill the great potentials of nanozymes.

The purpose of this book is not only to provide insightful knowledge of nanozymes but also to attract more researchers into the field and to inspire them to further broaden the field. Due to the importance of nanozymes and professional

writing with plenty of color illustrations and tables, this book should be an ideal choice for readers from different areas, such as chemistry, materials, nanoscience and nanotechnology, biomedical and clinical studies, environment, green chemistry, novel catalysts, etc.

I wish to express my appreciation to all the excellent scholars around the world who have contributed and will continue to contribute to the fields of nanozymes. I would also like to thank my lab members and my collaborators for their contributions to this exciting field. I thank my advisors Profs. Erkang Wang, Xinghua Xia, Yi Lu, and Shuming Nie for their guidance, support, and encouragement. I am much indebted to June Tang for her patience during the writing of this book.

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