

Preface

ENZYMES PERMEATE OUR LIVES in ways we never realize. They are used to prepare our foods and beverages, clean our clothes, and diagnose our illnesses. They are used for chemical syntheses and are incorporated into electromechanical devices. They are the protein machines behind life itself and, through the tools of biotechnology, they are being adapted to virtually all aspects of biomaterials handling.

Enzyme technology is driven by the need for economic, efficient, ecological processing. Cost-effective large-scale applications are made possible by the capacity for producing novel enzymes in large quantity through biotechnology. Manufacture, stabilization, packaging, and distribution are done on a scale that has taken enzymes from the shelf of exotic specialty reagents into the holding tank of bulk commodities. Manufacturing expertise is increasing as new and more efficient hosts for protein expression are developed. The enzyme industry is constantly seeking new markets; its biggest challenges lie in the discovery of new applications.

The pulp and paper industry is emerging as one of the largest markets for enzyme applications in the world. The demand for paper increases globally as standards of living rise and the need for clean, efficient processing is ever greater. Increased pulp yield, improved fiber properties, enhanced paper recycling, and reduced processing and environmental problems are all consequences of enzyme applications in the pulp and paper industry. Acceptance of these technologies is growing as knowledge and industry expertise increase.

We have long known the enzymes that act on paper: cellulases, hemicellulases, ligninases, and lipases. Only recently, however, have we begun to explore the potentials for their application in large scale, such as for bleach enhancement, contaminant removal, pitch removal, fiber modification, and lignin degradation. Enzymes are highly selective in their action. That is their bane and beauty. Conditions must be exact for their use, but the results are precise. Effects can be subtle and subject to interference from the harsh environments often found in industrial settings. For these reasons, some view enzyme applications skeptically and want more evidence of value before moving forward.

The symposium on which this book is based was sponsored by the Cellulose, Paper, and Textile Division at the 211th ACS National Meeting which took place in New Orleans, Louisiana, from March 24–28, 1996. The papers in this volume are exploratory. They probe the bounds of

possibility. They report the discovery of new biocatalysts and novel uses for those we know well. The authors are diverse, coming from the Americas, Europe, Asia, Africa, and Australia. They work in industry, academia, and government, and their expertise ranges from fundamental biochemistry and genetics to large-scale application and marketing. The processes are nascent. They take many different forms, and in few instances have optima been attained.

This volume is not meant to be definitive. In an emerging field as large and rapidly changing as the present one, it can only be a snapshot of progress. With time we will know of its success.

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