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# Preface

Enzymes and whole cells are able to catalyze the most complex chemical processes under the most benign experimental and environmental conditions. In this way, enzymes and cells could be excellent catalysts for a much more sustainable chemical industry. However, enzymes and cells also have some limitations for nonbiological applications: fine chemistry, food chemistry, analysis, therapeutics, and so on. Enzymes and cells may be unstable, difficult to handle under nonconventional conditions, poorly selective toward synthetic substrates, and so forth. From this point of view, the transformation—from the laboratory to industry—of chemical processes catalyzed by enzymes and cells may be one of the most complex and exciting goals in biotechnology.

For many industrial applications, enzymes and cells have to be immobilized, via very simple and cost-effective protocols, in order to be re-used over very long periods of time. From this point of view, immobilization, simplicity, and stabilization have to be strongly related concepts. Over the last 30 years, a number of protocols for the immobilization of cells and enzymes have been reported in scientific literature. However, only very few protocols are simple and useful enough to greatly improve the functional properties of enzymes and cells, activity, stability, selectivity, and related properties.

The second edition of *Immobilization of Enzymes and Cells* intends to complement as well as update the first edition. This volume now includes the following aspects of established and new protocols for immobilization:

1. Simple protocols for the immobilization of enzymes and cells that could be very useful for application at industrial scale.
2. Novel protocols for immobilization that can be deployed now or in the near future.
3. Immobilization protocols that can greatly improve the functional properties of enzymes and cells.
4. Different techniques for the characterization of immobilized enzymes and cells as suitable tools for the development of better immobilization techniques.
5. Protocols for the preparation of immobilized derivatives for use in very different nonconventional reaction media.
6. Different protocols for the preparation of immobilized derivatives possibly useful in varied areas of application: therapy, chemical industry, and so on.
7. New chemical reactors that overcome the limitations of a number of immobilized derivatives.

There is still a long and exciting path for developing very simple and efficient protocols for the preparation, characterization, and utilization of immobilized enzymes and cells. *Immobilization of Enzymes and Cells, Second Edition* treats many of the very interesting results already obtained, at the same time giving readers the tools to

develop even more important immobilization protocols. It seems clear that successful development of excellent protocols for immobilization will promote massive implementation of enzyme and cell systems as industrial biocatalysts. Such a development could prove decisive to the emergence of much more skilled and sustainable chemical industry—cost-effective production of very complex and useful molecules under the mildest conditions. The possible advances in fine chemistry, food chemistry, analysis, decontamination processes, and therapeutic applications, for example, only hint at the potential benefits.

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