

Introduction to the Proceedings of the Sixteenth Symposium on Biotechnology for Fuels and Chemicals

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Biotechnology is both an old and a new technology. It has expanded from the traditional fermentation industry to applied molecular biology.

Biotechnology can be defined as the use of biocatalysts to carry out desired transformations from one material to another. These biocatalysts can be enzymes or microorganisms. The transformation may be of raw materials into useful compounds or for the destruction of industrial wastes. One use of biotechnology is for the production of fuels and chemicals from renewable resources or fossil fuels.

This has been the broad area focused on by this symposium for the past 16 years. The Symposium on Biotechnology for Fuels and Chemicals presents both applied and fundamental work in this area performed by universities, industries, and government institutions. The goal, whether near term or long term, is to find and demonstrate efficient, economical methods for the use of biotechnology to support society's needs for fuels and chemicals. The symposium promotes interactions among researchers in an intimate setting to foster the interactions that will be necessary to commercialize and use these technologies. Efforts presented include all aspects of the process: the pretreatment and beneficiation of the raw material, the biological conversion in some reactor, the separation and recovery of the desired product, and the treatment of the waste streams from this and earlier legacy processes. There are also efforts on the sensing, monitoring, and control of processes as well as economic analyses to estimate the overall utility and impact.

The Sixteenth Symposium on Biotechnology for Fuels and Chemicals provided such a forum. There were 34 oral presentations and

81 poster presentations, for a total of 115. These were organized into sessions of Thermal, Chemical, and Biological Processing; Bioprocessing Research; Process Economics and Commercialization; and Environmental Biotechnology. There was also a special session on Past, Present, and Emerging Concepts in Applied Biological Research held in honor of Dr. C. D. Scott and marking the establishment of an award in his honor.

The Sixteenth Symposium was sponsored by the Biofuels Systems Division and Advanced Industrial Concepts Division of the US Department of Energy (DOE); the Oak Ridge National Laboratory; National Renewable Energy Laboratory; Idaho National Engineering Laboratory; Amoco Corporation; Archer Daniels Midland Company; Bio-Technical Resources, L. P.; Dorr-Oliver Inc.; Enzyme Bio-Systems Ltd.; Genencor International; Gist-Brocades; Golden Technologies Company, Inc.; Grain Processing Corporation; Martin Marietta Energy Systems, Inc.; Michigan Biotechnology Institute; New Energy of Indiana, L.P.; Process Systems, Inc.; Raphael Katzen Associates International, Inc.; Roquette America, Inc.; Solvay Enzymes, Inc.; A. E. Staley; Weyerhaeuser; and the Division of Biochemical Technology of the American Chemical Society.

Organization of the symposium was as follows:

Organizing Committee

Jonathan Woodward, *Chairman, Oak Ridge National Laboratory*

Charles E. Wyman, *Cochairman, National Renewable Energy Laboratory*

Graham F. Andrews, *Idaho National Engineering Laboratory*

Antonios A. Antonopoulos, *Argonne National Laboratory*

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James Doncheck, *Bio-Technical Resources, L.P.*

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Elias Greenbaum, *Oak Ridge National Laboratory*

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Donald L. Johnson, *Grain Processing Corporation*

Raphael Katzen, *Raphael Katzen Associates International*

Richard Moorer, *US Department of Energy*

Mark E. Reeves, *Oak Ridge National Laboratory*

John N. Saddler, *University of British Columbia*

Session Chairpersons and Cochairpersons

Session 1: Thermal, Chemical, and Biological Processing

Bruce E. Dale, *Texas A&M University*

Gene Petersen, *National Renewable Energy Laboratory*

***Session 2: Past, Present, and Emerging Concepts
in Applied Biological Research***

Arthur E. Humphrey, *Pennsylvania State University*

Charles E. Wyman, *National Renewable Energy Laboratory*

Session 3: Bioprocessing Research

William A. Weigand, *University of Maryland*

Eric N. Kaufman, *Oak Ridge National Laboratory*

Session 4: Process Economics and Commercialization

Raphael Katzen, *Raphael Katzen Associates International, Inc.*

James Doncheck, *Bio-Technical Resources, L.P.*

Session 5: Environmental Biotechnology

James Petersen, *Washington State University*

Frederick Colwell, *Idaho National Engineering Laboratory*

Poster Session

Karel Grohmann, *US Citrus and Subtropical Products Research
Laboratory*

Antonios Antonopoulos, *Argonne National Laboratory*

Special Topic Discussion Groups

Arthur Humphrey, *Pennsylvania State University*

Larry Russo, *New Energy Company of Indiana*

John Woodward, *Yellow Springs Instruments, Inc.*

Mark Zappi, *US Army Corps of Engineers*

Acknowledgments

The submitted manuscript has been authored by a contractor of the US Government under contract DE-AC05-84OR21400. Accordingly, the US Government retains a nonexclusive, royalty-free license to publish or reproduce the published form of this contribution, or allow others to do so, for US Government purposes.

Oak Ridge National Laboratory is managed by Martin Marietta Energy Systems, Inc., for the US Department of Energy under contract DE-AC05-84OR21400.

The National Renewable Energy Laboratory is operated by Midwest Research Institute, for the US Department of Energy under contract DE-AC02-83CH10093.

Other Proceedings in This Series

1. "Proceedings of the First Symposium on Biotechnology in Energy Production and Conservation" (1978), *Biotechnol. Bioeng. Symp.* 8.
2. "Proceedings of the Second Symposium on Biotechnology in Energy Production and Conservation" (1980), *Biotechnol. Bioeng. Symp.* 10.

3. "Proceedings of the Third Symposium on Biotechnology in Energy Production and Conservation" (1981), *Biotechnol. Bioeng. Symp.* 11.
4. "Proceedings of the Fourth Symposium on Biotechnology in Energy Production and Conservation" (1982), *Biotechnol. Bioeng. Symp.* 12.
5. "Proceedings of the Fifth Symposium on Biotechnology for Fuels and Chemicals" (1983), *Biotechnol. Bioeng. Symp.* 13.
6. "Proceedings of the Sixth Symposium on Biotechnology for Fuels and Chemicals" (1984), *Biotechnol. Bioeng. Symp.* 14.
7. "Proceedings of the Seventh Symposium on Biotechnology for Fuels and Chemicals" (1985), *Biotechnol. Bioeng. Symp.* 15.
8. "Proceedings of the Eighth Symposium on Biotechnology for Fuels and Chemicals" (1986), *Biotechnol. Bioeng. Symp.* 17.
9. "Proceedings of the Ninth Symposium on Biotechnology for Fuels and Chemicals" (1988), *Appl. Biochem. Biotechnol.* 17,18.
10. "Proceedings of the Tenth Symposium on Biotechnology for Fuels and Chemicals" (1989), *Appl. Biochem. Biotechnol.* 20,21.
11. "Proceedings of the Eleventh Symposium on Biotechnology for Fuels and Chemicals" (1990), *Appl. Biochem. Biotechnol.* 24,25.
12. "Proceedings of the Twelfth Symposium on Biotechnology for Fuels and Chemicals" (1991), *Appl. Biochem. Biotechnol.* 28,29.
13. "Proceedings of the Thirteenth Symposium on Biotechnology for Fuels and Chemicals" (1992), *Appl. Biochem. Biotechnol.* 34,35.
14. "Proceedings of the Fourteenth Symposium on Biotechnology for Fuels and Chemicals" (1993), *Appl. Biochem. Biotechnol.* 39,40.
15. "Proceedings of the Fifteenth Symposium on Biotechnology for Fuels and Chemicals" (1994), *Appl. Biochem. Biotechnol.* 45,46.

This symposium has been held annually since 1978. We are pleased to have the proceedings of the Sixteenth Symposium currently published in this special issue to continue the tradition of providing a record of the contributions made.

The Seventeenth Symposium is planned for May 7–11, 1995 in Vail, Colorado. We encourage comments or discussions relevant to the format or content of that meeting.