

Fourth Conference on Recovery of Bioproducts

Engineering Foundation

Co-chairs

Michael R. Ladisch, Purdue University, USA
W. Courtney McGregor, Xoma Corporation, USA
Irving Holzberg, Syntex Research, USA
Saburo Fukui, Bioindustry Development Center (MITI), Japan

Keahou-Kona, Hawaii, USA
17-22 April, 1988

Monday, 18 April

Tuesday, 19 April

The Recovery-Fermentation Interface

Session chair

J. R. Swartz, Genentech, Inc., USA

Recovery/Fermentation Interface: An Introduction

J. R. Swartz, Genentech, Inc., USA

Recovery/Fermentation Interactions in Human Growth Hormone Process Development

W. F. Bennett, R.C. Pai, J. Chang, N. McFarland and B. Bocher, Genentech Inc., USA

The Recovery of Highly Purified Biopharmaceuticals from Perfusion Cell Culture Bioreactors

C.P. Prior and J. A. Hope, Invitron Corp., USA

Genetic Approaches to Protein Purification

M. Uhlen, Royal Institute of Technology, Sweden

Recovery of Bioactive Molecules and Recombinant Proteins from Culture Broths

S. C. Nigam, H. Y. Wang, University of Michigan and T. Imanaka, Osaka University, Japan.

Bioproducts at Interfaces

Session chairs

J. L. Brash, McMaster University and J. D. Andrade, University of Utah, USA

Proteins at Interfaces I. Principles of Protein Adsorption

J. D. Andrade, University of Utah, USA

Proteins at Interfaces II. Competitive Adsorption in Multicomponent Systems

J. L. Brash, McMaster University, USA

Molecular Orientation of a Protein on the Surface of an Ion-Exchange Sorbent as a Function of Concentration

F.E. Regnier and I. Mazsaroff, Purdue University, USA

Cells at Interfaces: Modern Approaches to Cell Separation

D.E. Brooks, University of British Columbia, Canada

Membranes, Filtration and Centrifugation

Session chairs

S. Michaels, North Carolina State University, USA
L.S. Fries, Collagen Corp., USA

Ultrafiltration Membranes with Uniform Pores from Crystalline Bacterial Cell Envelope Layers

U. B. Sleytr, University für Bodenkultur, Austria

The Design of Biological Particle Processes during Selection Protein Purification

M. Hoare and P. Dunhill, University College London, UK

Crossflow Microfiltration of Cell Suspensions

S. B. Kessler and R. L. Bratzler, Sepracor Inc., USA

Tubular Carbon Membranes in the Treatment of Biotechnological Liquids

J.-M. Bauer, H. Brüscke, G. Moncorge and G. Tusel, Gesellschaft für Trenntechnik, Germany

Comparison of Gravity Decantation and Centrifugal Separation in Commercial Scale Extraction of Avermectin from Fermentation Broth

F.J. Mathews, Merck & Co., Inc., USA

Application of Centrifugal Separation and Crossflow Microfiltration for Cell Retention in Continuous Fermentative Production of L-Amino Acids

R. Wichmann and C. Wandrey, Institute of Biotechnology, and J. Berke, Degussa AG, Germany

Novel Plant Cell Tissue Culture Membrane Reactor with Continuous Cell Harvesting

J. E. Prenosil, M. Hegglin, K. -H. Yoon and M. Taya, Swiss Federal Institute of Technology, Switzerland

Immobilized Enzyme Bioreactors with Separations using Electrophoresis

S. Furusaki, University of Tokyo, Japan

Wednesday, 20 April

Chromatography

Session chairs

J. Hong, University of California, USA
R. D. Sitrin, Merck, Sharp and Dohme, USA

What does Industry really need?

R. D. Sitrin, Merck, Sharp and Dohme, USA

Chemically Modified Immuno-Affinity Ligands for Separation of Biological Products

S. Kato and E. Sada, Kyoto University, Japan

Separations by 'Non-Elution' Chromatography

C. Horvath, Yale University, USA

Scaling-Up Chromatographic Separations

E.N. Lightfoot, S. J. Gibbs and A. Athalye, University of Wisconsin, USA

Scale-Up Parameters in Chromatography of Amino Acids and Small Peptides

M. R. Ladisch, Purdue University and E. Firouztale, Rohm and Haas Co., USA

Commercial Purification of an Antibiotic by Chromatography on a Non-Functional Macroreticular Resin

R. Lander, A. Andrews, E. Paul and E. Seyhan, Merck, Sharp and Dohme, USA

Strategies for Industrial Scale Chromatography

Session chairs

F.G. Helfferich, Pennsylvania State University, USA
A. Hershman, Monsanto Company, USA

Strategies for High Performance Process Chromatography

R. Sitrin, Merck, Sharp and Dohme, USA

Influence of Pore and Particle Size on the Protein Loadability of Silica Based Anion Exchange Packings

W. Kopaciewicz, Amicon, USA

Gradient Focusing in Large Scale Chromatography Separations

N.-H. L. Wang, Purdue University, USA

Open Discussion Session Biosensors for Monitoring Purification Processes

Session chairs

D.Y. Wang, University of Michigan, USA
B. Mattiason, Chemical Center Lund, Sweden

Open Discussion Session Future Developments in Membrane Technology

Session chair

D.T. Wasan, Illinois Institute of Technology, USA

Open Discussion Session Analytical Methods for Biological Products

Session chairs

R. R. Gaughan, Rohm and Haas Company, USA
G. Wassermann, Smith, Kline & French, USA

Bioanalytical Chemistry

J. L'Italien, Smith, Kline & French, USA

Influence of Government Agencies on Recovery of Bioproducts

Session chairs

S. Drew, Merck, Sharp and Dohme, USA
S. Ackerman, Xoma Corp., USA

Purification of Epidermal Growth Factor

R. Johnson, Chiron Corp., USA

Purification of Tissue Plasminogen Activator

S. Builder, Genentech, Inc., USA

Current Criteria for Purity of Biological Products

K. Zoon, FDA - Office of Biologicals, USA

Aqueous Two-Phase Partitioning

Session chairs

D. Kubek, Merck, Sharp and Dohme, USA
H. Hustedt, Gesellschaft für Biotechnologische Forschung, Germany

Large Scale Extraction of Protein - Introductory Remarks

M.-R. Kula, University of Düsseldorf, Germany

Present Developments and Economic Aspects of Aqueous Two-Phase Extraction

H. Hustedt, Gesellschaft für Biotechnologische Forschung, Germany

Polymer Enhanced Precipitation - A Practical Application of Two-Phase Partitioning for Protein Purification

S. V. Ho, Monsanto Company, USA

Thursday, 21 April

Product Stability

Session Chairs

R. E. Jones, Liposome, Inc., USA
P. Winter, Burroughs-Wellcome, Ltd, UK

Perspectives in Product Stability - Opening Remarks

R. Jones, Liposome, Inc., USA

Predicting Protein Unfolding Equilibrium

B.E. Dale, Colorado State University, USA

Protein Carboxyl Methyltransferase: A Useful Tool for Analysing Deamidation - Dependent Isoaspartate Formation in Protein and Peptides

D. W. Aswad, University of California, USA

Investigation on the Stability of Human Growth Hormone

R. Pearlman, B. H. O'Connor, and S. L. Brehm, Genentech, Inc., USA

Formulation of Interferon - β -Ser 17 (Betaseron™), a Hydrophobic Protein, Using a Nonionic Surfactant
S. Hershenson, Z. Shaked, T. Stewart, and C. Carroll,
Cetus Corp., USA

Friday, 22 April

Process Monitoring

Session chairs

C.L. Cooney, Massachusetts Institute of Technology, USA

J.-L. Romette, University of Compiègne, France

Automation of Aqueous Phase Extraction during Continuous Isolation of Microbial Enzymes

N. Papamichael and H. Hustedt, Gesellschaft für Biotechnologische Forschung, Germany

New Approaches to more Efficient Fractional Precipitation of Proteins

N. J. Titchener-Hooker, P. Richardson, M. Hoare, and P. Dunhill, University College London, UK

Bioaffinity Chromatography: Large-Scale Purification of Recombinant Human Interleukin-2 (rIL-2) and its Receptor

F. Khan, R. T. Bartlett, R. Suydam, M. A. Johar, J. Evans, P. R. Pine, H. Umagat, P. C. Familletti, and V. R. Rai, Hoffman LâRoche, USA

Computer Control of the Continuous Affinity Recycle-Extraction Process (CARE)

N. F. Gordon and C. L. Cooney, Massachusetts Institute of Technology, USA

Standardisation of Bioseparation Processes

I.Endo, The Institute of Physical and Chemical Research, Japan

The use of Expert Software to Control Chromatographic Processes

A. C. Kenney, P. W. Thompson, and J. L. Harris, Oros Systems, Inc., UK

Poster Session

Session chairs

M.-R. Kula, Heinrich-Heine University, Germany

H. R. Bungay, Rensselaer Polytechnic Institute, USA

Characterization of Cation Charged Ultrafiltration (UF) Membrane

Shigemitsu Sbe, Masazumi Date, Tetsuya Kawakita, Ajinomoto Co., Inc., Japan

Continuous Adsorptive Extraction of Proteins

Noubar B. Afeyan, Robert C. Dean Jr, Massachusetts Institute of Technology, USA

Preparation and Diffusion Studies of Crosslinked Membranes for Biological Applications

Sharon M. Fujita, Apprise Inc., Susan N. Behrens Thomas, David S. Soane, and Harvey W. Blanch, University of California at Berkeley, USA

Application and Economical Aspects of Whole Broth Extraction

K.-H. Brunner, Westfalia Separator AG, Germany, and P.J. Scholes, Akzo Chemie UK Ltd., UK

Large Scale Purification of Immunoglobulins

Gary J. Calton and Lin Peng, Rhône Poulenc Rorer, USA

Reversed Micellar Extraction of α -Amylase

M. Dekker, K. Van't Riet, B.H. Bijsterbosch, R.B.G. Wolbert and R. Hillhorst, Agricultural University, The Netherlands

Characterization and Utility of DNAses in Tissue Culture Broths

George Dove, Cutter Group, Miles, Inc., USA

A Continuous Method of Refolding Protein

Parrish M. Galliher, Biogen Research Corp., USA

A Coagulation Factor IX Concentrate Treated with Solvent/Detergent for Viral Inactivation

Dan M. Gee, David B. Clark, Shirley I. Miekka, H. Evam Behre and William N. Drohan, American Red Cross Laboratories, USA

Membrane-Based Affinity Separation of Protein

Randal A. Goffe, James L. O'Connor, Stephen E. Zale, A.R.M. Azad and Stephen B. Kessler, Sepracor, Inc., USA

Novel Hydrophobic Interaction Chromatography Media for Preparative Purification of Monoclonal Antibodies

Peter Gagnon, Validated Biosystems, Inc., Joel Henner, Becton Dickinson Monoclonal Center, Peter Grandics and Susan Szathmary, Sterogene Biochemicals, Inc., USA

Purification and Properties of Rec-Human Interferon Gamma

Yukio Hashimoto, Kyowa Hakko Kogyo Co., Ltd., Japan

Protein Purification and Concentration Using Reversed Micelles

T. Alan Hatton, Massachusetts Institute of Technology, USA

Validation of Chromatographic Purification Methods for the Manufacture of Therapeutic Monoclonal Antibodies

C.R. Hill, Celltech Limited, UK

Fructose Recovery from Zymomonas Broths

Michael R. Johns and Paul F. Greenfield, University of Queensland, Australia

Industrial Scale Alkaline Protease Extraction in Amorphous Form by Aqueous Two-Phase System

C. Y. Kim, C. E. Brothers, T. F. Farver and E. K. Lee, Miles, Inc., USA

Molecular Thermodynamics of Aqueous Two-Phase for Bioseparations

Robert S. King, Charles Haynes, Steve Rathbone, Harvey W. Blanch and John M. Prausnitz, University of California, USA

Purification of Recombinant α -Amylase with Immuno-Affinity Chromatography Using Monoclonal Antibody

T. Kobayashi, M. Kamihira, M. Taniguchi and S. Iijima, Nagoya University, Japan

Cell Disintegration by High Turbulent Liquid Impingement Jets

P. Krämer and A. Bomberg, Dechema-Institute, Frankfurt/Main, Germany

Modeling of Protein Recovery from Cell Homogenate Using a Continuous Adsorption Process

J.P. van der Wiel, R. A. J. M. van der Grinten, J. Krijgsman and J. A. Wesselingh, Delft University of Technology, The Netherlands

Experiences with a Rotational Shear Filter in the Recovery of Biological Products

K.-H. Kroner and H. Schütte, Gesellschaft für Biotechnologische Forschung, Germany

Tangential Filtration of Microbial Suspensions—Filtration Resistances and Model Development

B. Riesmeier, Braunschweiger Produktionenges Für Biotechnologie, K. H. Kroner, Gesellschaft für Biotechnologische, M. -R. Kula, Heinrich-Heine University, Germany

Implications of Module Design and Operating Conditions on the Recovery of Protein Products by Micro and Ultrafiltration

Peter Levy, Amicon Division, W.R. Grace, USA

Mathematical Modeling of an Affinity Ultrafiltration

J. H. T. Luong, K. B. Male, A. L. Nguyen, and A. Mulchandani, Biotechnology Research Institute, National Research Council of Canada, Canada

Protein Recovery through Microporous Membrane Filters

Jerold M. Martin, Rajiv Datar, Richard L. Manteuffel, Pall Ultrafine Filtration Corporation, USA

Development and Production System of Elastases

Yoshiharu Shirasu, Shigeru Matsuki, Jun-ichi Tanaka, Hiroshi Ikenaga and Kei-ichi Morimoto, Kirin Brewery Company Limited, Japan

Bioproduct Recovery from Whole Broths and Unclarified Homogenates Using Immobilized Adsorbents

Somesh C. Nigam and Henry Y. Wang, The University of Michigan, USA

Stabilization of h-SOD by Site Specific Mutagenesis

Tsuchio Otani, Motohiro Ogishima, Koji Suzuki, Kazunori Imai, Seiichiro Sekoguchi, Keiko Nogata and Hitoshi Sagai, Toyo Jozo, Japan

Centrifugal Separation of Solids from a Shear-Sensitive Broth

Jiri Placek, and W. Martin Teague, Enzyme Bio-Systems, Ltd., USA

Optimization of Resolution for New Ion Exchange Gel Media Q and S Sepharose® High Performance. II. Pilot Scale Techniques

Jan Reuterby, Christine Markeland-Johansson, Per-Erik Sjöholm, Robert Svensson, Annelie Persson and Per Hedman, Pharmacia LKB Biotechnology AB, Sweden

Encapsulation of Mammalian Cell Culture for Separation of Monoclonal Antibody

Sung-Koo Kim and ChoKyun Rha, Massachusetts Institute of Technology, USA

Chromatographic Purification of a Macromolecular Antibiotic SN-07

Jun Saeki, Seiji Ishida, Eitaro Kumazawa, and Gosei Kawanishi, Snow Brand Milk Products Co., Ltd., Japan, Shigeo Katoh and Eizo Sada, Kyoto University, Japan

Heat Conditioning of Microbial Extracts to Improve Protein Isolation

J. Schnell and M.-R. Kula, Heinrich-Heine University, Germany

Performance of Centrifugal Extractors during the Recovery of Penicillin by Reactive Extraction

K. Schügerl and Z. Likidis

Influence of Scale on Cell Breakage Performance with High-Speed Agitator Bead Mills

H. Schütte, B. Jüring, N. Papamichael, Gesellschaft für Biotechnologische Forschung mbH, Netzsch Feinmahltechnik GmbH, M. -R. Kula, Heinrich-Heine University, Germany

Genetic Design and Fermentation Strategy for Product Recovery from Micro-Organisms

R. F. Sherwood, N. P. Minton, S. P. Chambers, M. Lancaster and T. Atkinson, Centre for Applied Microbiology and Research, UK

Recovery of Bacterial Exotoxins

Joseph Shiloach and Jeanne B. Kaufman, National Institutes of Health, USA

Fouling Phenomena in Membrane Separation

H. Ojamo, L. Holmström, M. Linko, P. Markkanen and M. Siika-aho

Hollow Fiber Contained Liquid Membrane Recovery of Fermentation Products

R. Basu, A. Sen Gupta and K. K. Sirkar, Stevens Institute of Technology, USA

Isolation and Purification of Endo-Polygalacturonase by Affinity Chromatography in a Fluidized Bed Reactor

W. Somers, K. Van't Riet, H. Rozie A, Bonte, F. Rombouts and J. Visser, Agricultural University, The Netherlands

Histidine as a Versatile Multimodal Chromatographic Ligand: From Lab to Process Scale

M. A. Vijayalakshmi, University of Compiègne, France

