



Biotechnology Training Institute
presents

Applied Principles and Techniques in Tangential Flow Filtration (TFF)

Tangential Flow Filtration

Schedule at URI Providence

Session Spring 2011

Lecture: March 15

Workshop: March 16 -18

Session Summer 2011

Lecture: August 9

Workshop: August 10 -12

Session Fall 2011

Lecture: November 1

Workshop: November 2 - 4

Seminar is designed for individuals (engineers, scientists, managers, technical personnel and researchers) who require an in-depth review of the principles and their application to processes in the areas of Process Development, Manufacturing and Quality Assurance/ Validation.

The seminar is presented by John Rozembersky. With his hands-on experience and in-depth knowledge of filtration and purification spanning close to 30 years with Millipore, Filtron and Pall, John is internationally recognized as the leading authority in TFF in the biopharmaceutical sector from bench-top development to large scale manufacturing with both flat sheet (cassette) and hollow fiber formats.

Lecture

A comprehensive one-day seminar on the applied principles and techniques used for tangential flow filtration applications. Course is designed to help individuals gain a solid understanding to the parameters and factors that affect TFF membrane performance and product recovery for biopharmaceutical applications. The seminar covers topics that will help define and identify current issues related to performance, scale up, optimization, cleaning (CIP), and methods development.

Lecture attendance limited to 30. **Tuition: \$595** includes hard color copy of lecture notes.

Workshop

A 3-day "hands-on" laboratory workshop course. Application trials will be performed using state-of-art bench top systems. The principles and techniques presented in the prerequisite* TFF lecture (above) will be applied in this workshop. Trial objectives will involve performing required initial membrane and element characterization, determining optimum operating conditions that will meet trial objectives, perform process runs to include concentration and diafiltration with complete data acquisition and analysis, and CIP to achieve maximum membrane recovery. Data developed in the trial will be applied to a scale-up system problem and SOP. Both **cassettes and hollow fiber configurations** are used.

Laboratory attendance limited to 18. **Tuition: \$1,595**

Lecture & Workshop combined **Tuition \$1,860** (savings of 15% or \$330 when taking same time).

TO REGISTER, EMAIL Bruce_Birch@mail.uri.edu **or CALL him at** (401) 277-5097.



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Lecture Topics

- **Types of Filtrations**
 - Direct Flow vs. TFF
 - **Optimization**
 - Product Recovery
 - Membrane Recovery
 - Filtrate Flux Rate
 - **Factors that Affecting Performance**
 - Membrane & Element Type/Configuration
 - Pressure
 - Cross Flow
 - Concentration
 - Temperature
 - Ionic Conditions
 - **Applications**
 - Concentration
 - Diafiltration: Continuous vs Discontinuous.
 - Fractionation
 - Cell Harvest and Clarification
 - **Cleaning (CIP) and Cleaning Validations**
 - **Types of Membrane Configurations**
 - Cassette
 - Spirals
 - Hollow Fibers
 - **Membrane Properties**
 - Selectivity Profiles
 - Permeability: Water vs Process
 - Adsorption Characteristics
 - Cleanability
 - Mass Transfer Coefficient
 - **Process Scale-up**
 - Linear vs Non-linear Scale-up
 - Optimization
 - Major Considerations for Success
 - **Standard Operating Procedures**
 - Preconditioning
 - UF/DF – Product Recovery
 - Post-conditioning
- Membrane Companies (Review)**

Workshop Topics

Learn how to

- develop and interpret initial properties of a membrane element: optimize process operating conditions for maximum performance & product yield
- compare actual performance between **cassette and hollow fiber** formats
- compile and apply data for scale-up system design
- use the data to help identify and address problems typically encountered

Day 1 Initial Membrane & Element Preparation and Characterization

Day 2 Optimization – determining the optimum process operation conditions
UF/TFF - Protein concentration and diafiltration [TMP Control Mode]
MF/TFF – Discuss and review cell clarification [Permeate Flow Control Mode]

Day 3 Cleaning and Membrane Recovery Study
Performance Summary
Scale-up Project – How to go from Bench top to Pilot to Manufacturing



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BIO - John Rozembersky

John Rozembersky is President of the Rozembersky Group, Inc, an independent TFF consulting firm founded in 2005 that specializes in tangential flow filtration applications and processes in the Biopharmaceutical industry and VP of Membrane Technology at WaterSep BioSeparations, a manufacturer of hollow fiber membrane products.

With over 30 years of hands-on experience and in-depth knowledge in membrane technologies, he is an internationally recognized authority in TFF in the biopharmaceutical sector from

bench-top development to large scale manufacturing.

His career experience in membrane technologies include:

- ▲ 5+ years (current), VP of Membrane Technology at **WaterSep Technologies**, an emerging start-up hollow fiber membrane company.
- ▲ 6+ years (current), Principal Consultant at **The Rozembersky Group**,
- ▲ 10 years, VP of TFF Technical Support at **Pall Corporation**
- ▲ 10 years, Co-founder and Executive VP at **Filtron Technology Corporation**
- ▲ 8 years, Membrane manufacturing and Process Development at **Millipore Corporation**

By applying theory and a hands-on approach, John Rozembersky has becoming the “go-to” expert for both flat sheet and hollow fiber membranes and process systems. He has successfully defined, designed, optimized and solved technical problems for hundreds of upstream and downstream TFF applications that include: plasma and protein fractionation, vaccines, recombinant proteins purification, virus removal and cell harvesting/clarification applications. He has presented numerous lectures and seminars at conferences and at key biotechnology companies on the fundamentals and applied principles of TFF to real-life applications.

Area of Technical and Business Competitance:

- ▲ **Membrane Process Development**
- ▲ **Membrane Element Development**
- ▲ **TFF Application Development**
- ▲ **Application Troubleshooting**
- ▲ **Sanitary Process Systems Design and Shakedown**

John Rozembersky completed both his BS and MS studies in Chemical Engineering at the New Jersey Institute of Technology.