

American Filtration and Separations Society Spring Conference 2013

**Minneapolis, Minnesota, USA
6-9 May 2013**

ISBN: 978-1-62993-148-7

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2013) by the American Filtration & Separations Society
All rights reserved.

Printed by Curran Associates, Inc. (2013)

For permission requests, please contact the American Filtration & Separations Society
at the address below.

American Filtration Society
7608 Emerson Avenue South
Richfield, MN 55423

Phone: (612) 861-1277
Fax: (612) 861-7959

www.afssociety.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2634
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

PLENARY SESSION I

Developments in the Production of High Surface Area Fibers and Nonwovens for Filtration	1
<i>Behnam Pourdeyhimi</i>	

TECHNICAL SESSION, TRACK 1 – WATER AND PROCESS FLUID FILTRATION

Sour Water Production and Processing in Oil & Gas Operations	2
<i>David Engel</i>	
Estimating Municipal Filter Press Cloth Life	3
<i>Ernest Mayer, Paul L. Scholtyssek, Sheldon Lipke, Marques Eley</i>	
A Review of the Rotary Pressure Filter for the Filtration of a Liquefied Gas Slurry	35
<i>Barry A. Perlmutter</i>	
How to Compare Performances of Domestic Pools and Spas Filters	50
<i>Christophe Peuchot, Gerard J. Lynch</i>	

TECHNICAL SESSION, TRACK 2 – FILTER TESTING I

Calibration Filter	51
<i>K. C. Kwok</i>	
Zen of Filter Classes	52
<i>R. Vijayakumar, Marco Adolph</i>	
Impact of Residential HVAC Filtration on Indoor Concentration of Submicron Particulate Matter	58
<i>Thad Ptak, Chrystal Gillilan</i>	
Test Method for Measurement of Performance Degradation of Electrostatically Enhanced Filter Media	59
<i>Thad Ptak, Mark Landis, Mark Seitz</i>	

TECHNICAL SESSION, TRACK 3 – PRACTICAL APPLICATION OF FILTRATION MEDIA

Wetlaid Media and its Application to the Filtration Industry	60
<i>Andrew J. Goodby</i>	
Spiral Wound & Pleated Membrane Construction Secrets	74
<i>Peter S. Cartwright</i>	
The Advantages of Nylon Nonwovens in Filtration	75
<i>Albert Ortega, Erin Carter</i>	
Monofilament Filtration Fabric	87
<i>Robert Hamilton</i>	

TECHNICAL SESSION, TRACK 1 – TOPICS IN FILTRATION AND MONITORING

New Filtration Product Offering for High Temperature Fluid Applications Utilizing Z-Plex Technology	102
<i>Travis Stifter</i>	
Aspire Hydrophilic PTFE Eliminates the Need for Pre-wetting	103
<i>Christopher Keller</i>	
Technique for Measuring the Particle Retention of Liquid Filters to 10 Nanometers	110
<i>Gary Van Schooneveld, Don Grant</i>	
Heavy Metal Removal Using Bio-Based Adsorbents	124
<i>Chuanfang Yang, Lixia Cao, Lei Li</i>	

TECHNICAL SESSION, TRACK 2 – SIMULATION & MODELING

Virtual Filter Media Development - Highlights from Eight Years of Experience	138
<i>Martin Lehmann, Friedemann Hahn, Alexander Killan</i>	
Improved Modeling of Loading Kinetics in Detailed Filter Media Simulations with Geodict	139
<i>J. Becker, F. Hahn</i>	
Coupling Different Size Scales in the Numerical Simulation of Filtration Processes	140
<i>Johannes Weber, M. Piesche</i>	
Modeling and Numerical Simulation on the Filter Element Scale	151
<i>Dimitar Iliev, Oleg Iliev, Ralf Kirsch, Zahra Lakdawala, Aivars Zemitis</i>	

TECHNICAL SESSION, TRACK 3 – FILTER MEDIA

Advances in Filtration Technology using Sintered Metal Filters	162
<i>Kenneth L. Rubow</i>	
Cleaning and Validation of Metal Filters	163
<i>Sue Reynolds</i>	
The Advantage of Bekipor® ST for use in Solid/liquid Filtration	164
<i>Jeremie De Baerdemaeker</i>	
Pressure Drop, Filtration Efficiency and Cleanability of Woven and Nonwoven Multi-layer Filter Media	165
<i>Markus Knefel</i>	

TECHNICAL SESSION, TRACK 1 – FILTRATION & ADSORPTION

Filtration and Separation for Zero Emission Vehicles	166
<i>Michael Harenbrock, Stuart Miller, Michael Fasold, Cedric Dackam</i>	
Gas Cleaning for Particles and Molecules – from Filtration to Adsorption	181
<i>Heinz Fissan, Hartmut Finger, Uta Sager, Stefan Haep, Dieter Bathen</i>	
Polymer-based Spherical Activated Carbon as High Performance Material for Liquid Phase Filtration Applications	195
<i>Christian Schrage, Bertram Böhringer, Raik Schönfeld, Saygin Kurt, Raiser Jan, Kämper Stefan</i>	
Developing Ion Exchange Membrane from Waste Expanded Polystyrene for Heavy Metal Removal from Industrial Waste Water	196
<i>Yong Kim, Ihsan Uluturk, Chen-Lu Yang</i>	

TECHNICAL SESSION, TRACK 2 – MEASUREMENT TECHNIQUES AND TESTING

Filter System for Space Habitat: Concept Design and Evaluation	211
<i>R. Vijayakumar, Juan H. Agui</i>	
Reducing Complexity and Cost through Technology: Direct Formed 2- and 3-d Filter Structures for Use in Transportation and Industrial Filtration	212
<i>Brent D. Dillie, Bennett C. Ward</i>	
Determination of Fractional Efficiency and Loading of Compressed Air Filters in Overpressure up to 7 Bar	223
<i>Martin Schmidt, Sven Schütz</i>	
Measurement Techniques and Data Evaluation Procedures for Filter Testing with Polydisperse Agglomerates and Aggregates	242
<i>Heinz Fissan, Heinz Kaminski, Christof Asbach, Jelina Buha, Jing Wang</i>	

TECHNICAL SESSION, TRACK 3 – APPLICATION OF NANOFIBERS

Permeability, Porosity and Capture Efficiency of Filter Media with Recycled PET Nanofiber Yarns	255
<i>Kitchaporn Nartetamrongsutt, George G. Chase</i>	
Alumina Nanofiber Membranes	266
<i>Jonathan W. Rajala, George G. Chase</i>	
Effect of Solution Properties on Electrospun PdO-TiO₂ Nanofiber Morphology	280
<i>Laila Shahareen, George Chase</i>	

Ceramics Membranes based on Alumina Nanofibers for Gas and Liquid Separation	292
<i>Michael Kutuzov</i>	

PLENARY SESSION II

Advancements in Coalescence Filtration	293
<i>Benjamin J. Mullins</i>	

TECHNICAL SESSION, TRACK 1 – SOLID & LIQUID FILTRATION I

Filtration of Cleaning and Degreasing Baths with Automatic Filtration System prior to Cataphoretic Painting of Car Bodies	294
<i>Stefan Strasser, Juergen Woegerer, Alois Wimmer</i>	
Suspended Solids Fouling and Column Protection Using Separation Technologies	308
<i>Scott Williams, David Engel, Mary King</i>	
Reduction of Cake Resistance with Filter Aids: Improved Filterability of Hydrolyzed Biomass Suspensions	319
<i>Teemu Kinnarinen, Mohammad Golmaei, Wenping Li, Antti Hakkinen</i>	
Novel Spiral Element Membrane Applications	329
<i>Scott Yaeger</i>	

TECHNICAL SESSION, TRACK 2 – OIL-MIST SEPARATION

A New Computational Fluid Dynamics (CFD) Model for Coalescence Filtration	330
<i>Ryan Mead-Hunter, Andrew J. C. King, Benjamin J. Mullins</i>	
Field Testing of CCV Filters in On- and Off- Highway Applications	338
<i>Arne Bredin, Benjamin J. Mullins</i>	
The Influence of Soot on a Micro and Macro Scale in CCV Filter Systems	345
<i>Ryan Mead-Hunter, Andrew J. C. King, Benjamin J. Mullins</i>	
Discontinuous Filtration, and Soot Measurement in Filters - Towards a More Realistic Test Method for CCV Filters.	351
<i>Benjamin J. Mullins, Arne Bredin, Ryan Mead-Hunter</i>	

TECHNICAL SESSION, TRACK 3 – GAS-SOLID SEPARATION

Development of International Standard Test Methods for Gas Turbine Inlet Filters	358
<i>Bruce McDonald</i>	
The Impact of a Newly Developed Testing Protocol for Gas Turbine Intake Air Filtration Systems	367
<i>Bob Burkhead</i>	
Laboratory Test for Water and Salt Water Coalescence/Migration which Mimics In-Situ Conditions for Gas Turbine Filters	368
<i>Al Vatine</i>	
Removal of Water Droplets from Intake Air	369
<i>Wilson Poon, Ryder Pingry, W. L. Gore</i>	

PLENARY SESSION III

Intellectual Property Issues in Global Markets with Emphasis on China	370
<i>Michael Schumann</i>	

TECHNICAL SESSION, TRACK 1 – SOLID & LIQUID SEPARATION II

Separation of Water Dispersions in Diesel Fuel Using Superhydrophobic Tubes of Nanofibers	394
<i>George G. Chase, Goutham Viswanadam</i>	
Innovative Coalescing Media Studies in Water Removal Applications from Lubricating Oils	407
<i>Ruijun Chen, Thomas Ramsey</i>	

Deemulsifier-free Slop-oil Emulsion Destabilization	420
<i>Ingemar D. Quintero, José A. Sorrentino, María A. Rodríguez</i>	
Filter Media for Removal of Emulsified Water from Ultra Low Sulfur Diesel	433
<i>Sarfaraz Patel, George Chase</i>	

TECHNICAL SESSION, TRACK 2 – CABIN AIR FILTRATION

Electret vs. Nanofibers for Automotive Cabin Air Filtration	451
<i>Andreas Seeberger, Thomas Ertl, Anke Jung, Stefanie Link</i>	
Investigation on the Filtration Efficiency of Vehicle Cabin Air Filters Affecting In-cabin to On-roadway (I/O) Ultrafine Particle Concentration Ratios	452
<i>Bin Xu</i>	
Media Concepts for Meeting the Recent Challenges in Automotive Cabin Air Filtration	453
<i>Andreas Scope</i>	
Validation of a Soot Generator and Characterization of Air Filtration Media Using Soot as a Test Aerosol	469
<i>Christoph Krambs, Steffen Grunz, A. Hellmann, Alexandra Lazarevic, Siegfried Ripperger, Christine Stanfel</i>	

TECHNICAL SESSION, TRACK 1 – SOLID-LIQUID TRANSPORTATION

Static Control Filter Media - Investigation of the Impact on Electro-static Charging of Hydraulic Fluids	470
<i>Marco Van Boven</i>	
Fundamental of Filtration in Gas Processing Plants; ‘A Filter is just a Filter, Right?’	486
<i>Kenneth J. Winston</i>	

TECHNICAL SESSION, TRACK 2 – FILTRATION IN TRANSPORTATION I

Case Study - Impact of Poor Diesel Fuel Quality on an Urban Fleet	487
<i>Barry Verdegan, Cliff Burbrink, Dakota Johnson, Sherif Abou-Rayan, Henry Amirkharian, Amit Baddi</i>	
Keep Running: Bulk Diesel Fuel Filtration, Why the WW Fuel Charter May Not be Clean Enough, and the Importance of Inlet Filtration	497
<i>Joseph Block, James Doyle, Scott Grossbauer, Brad Grove, Philip Johnson, Paul Klick</i>	
Determination of Water Droplet Size in Diesel and Aviation Fuels	509
<i>Larry Hollingsworth, Gary Besse</i>	
Complete Filtration for On-vehicle Liquefied Propane Gas	510
<i>Janelle Hampton, Philip Johnson, James Doyle, Karthik Viswanathan</i>	

PLENARY SESSION IV

Future Filtration Requirements for the Next Generation Engines	519
<i>M. Matti Maricq</i>	

TECHNICAL SESSION, TRACK 1 – NOVEL SEPARATION TECHNOLOGIES

Characterization of Properties and Separation Efficiency of Layered Nonwoven Filter Media	520
<i>Mathias Stolarski</i>	
Advanced Treatment Technologies for Food Processing Wastewater Treatment - A Case History	521
<i>Peter S. Cartwright</i>	
Engineered Biofiltration: Destroying Persistent Non-point Source Pollutants using Engineered Nanoglass Adsorbents Sold under the Trade Name Osorb®	522
<i>Stephen Spoonamore, Hanbae Yang</i>	
Introduction to Hollow Fiber Membranes	538
<i>Sandra G. Iverson, Christopher J Fournier</i>	

TECHNICAL SESSION, TRACK 2 – FILTRATION IN TRANSPORTATION II

Coalescence of Submerged Water Droplets in Diesel by Electrowetting	549
<i>George Chase, Abdulwahab Aljuhani</i>	
The Experimental Performance of Isolated Multi-layer Media in Gas-Liquid Coalescence Filtration	556
<i>Yiren Wu, Gabriel M. Manzo, George G. Chase</i>	
On the Relevance of SAE J1488 and Mono-olein Addition for Evaluating the Performance of Fuel-Water Separators (III)	577
<i>Yan Li, Mike Madsen, Sterling Hansen, Andrew J. Dallas</i>	
Voice of the Customer - Why We Filter Fuels and Lubes for Common Rail Fuel Systems	587
<i>Barry Verdegan, Norm C. Blizard, Dave Genter, Jim Walls, Dan Ruckel, Mark Warwicker, Heinz Stutzenberger, Tom Livingston</i>	

TECHNICAL SESSION, TRACK 3 – CFR PUBLIC SESSION – INTEGRATION FILTRATION RESEARCH AND FILTER LOADING

Integrative Filtration Research at the Center for Filtration Research (CFR)	605
<i>David Y. H. Pui</i>	
Predicting Porosity Of Dust Cakes Under General Conditions Via Brownian Simulation	606
<i>Gustaf Lindquist, Christopher Hogan Jr., David Y. H. Pui</i>	
Loading of Agglomerate Particles on Flat Filter Media	607
<i>Qisheng Ou, David Y. H. Pui, Da-Ren Chen</i>	

TECHNICAL SESSION, TRACK 1 – FILTER TESTING

New International Standard Test Methods of Aerospace Filters	618
<i>Christophe Peuchot</i>	
Long Term Stability of the Calibration Process of Optical Particle Counting Systems	619
<i>Michael Schumacher, Michael Tscherpel</i>	
Filter Cut Point and Pore Size Distribution using Certified Reference Microspheres	628
<i>Graham Rideal, Jamie Storey</i>	

TECHNICAL SESSION, TRACK 2 – AIR AND GAS FILTRATION

Comparison of the Particle Penetration through Using Different Air Filter Test Methods	635
<i>Tim Johnson, Hans-Georg Horn</i>	
Modeling Depth and Surface Dust-Loading in Pleated Air Filters	636
<i>Shahryar Fotovati, Ahmed Saleh, Hooman Tafreshi, Behnam Pourdeyhimi</i>	
Meltblown - A Unique and Indispensable Technology in Air and Liquid Filtration	637
<i>Christine Sun</i>	

TECHNICAL SESSION, TRACK 3 – CFR PUBLIC SESSION – FILTRATION OF LIQUID-BORNE NANOPARTICLES, VIRUSES AND FLY ASH

Liquid Filter Evaluation Using Aerosolization and Nanoparticle Tracking Techniques	638
<i>Tsz Yan Ling, David Y. H. Pui</i>	
Measurement of Airborne Viruses and its Application in Virus Aerosol Filtration Research	654
<i>Zhili Zuo, Thomas Kuehn, David Pui, Harsha Verma, Aschalew Bekele, Sagar Goyal, Jessica Appert, Peter Raynor</i>	
Characterization of Fly Ash Collected in Filtration Systems in Waste Incineration Plants	668
<i>Jelena Buha, Nicole Mueller, Bernd Nowack, Andrea Ulrich, Jing Wang</i>	

STUDENT POSTER SESSION

Electrospun Fibers as Air Filtration Media	669
<i>Negar Ghochaghi, Gary Tepper</i>	

Virtual Prototyping of Next Generation Oil and Fuel Filter Media by Enhanced Particle Modeling	670
<i>Friedemann J. Hahn, Martin J. Lehmann</i>	
Monolayer Polymeric Coatings to Enhance the Performance and Service Life of Membranes for High Temperature Biomass Pretreatment	671
<i>Vincent Kandagor, Gajana Bhat, Ramesh Bhave</i>	
New Generation Nanofiber Filters	673
<i>Muralidha Lalagiri</i>	
Permeability, Porosity and Capture Efficiency of Filter Media with Recycled PET Nanofiber Yarns	674
<i>Kitchaporn Nartetamrongsutt, George G. Chase</i>	
Effect of Solution Properties on Electrospun PdO-TiO₂ Nanofiber Morphology	675
<i>Laila Shahareen, George Chase</i>	
Simulation of Fluid-structure Interaction for Porous Pleated Filter Media	676
<i>Alexander Traut, Martin J. Lehmann</i>	
Experimental Study on Shrinkage Phenomenon of Fine Fibers Media in Gas-Liquid Coalescence Filtration	677
<i>Yiren Wu, Gabriel M. Manzo, George G. Chase</i>	
Author Index	