

ROBERT D. LOUSENBERG, PhD

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POLYMER / ORGANIC CHEMIST

Dedicated, driven, and highly accomplished professional with over 15 years of experience developing commercially viable applications of polymer and organic chemistry compounds. Proven ability to collaborate with cross-functional teams to advise on the scale-up and manufacturing of new and existing polymer and organic compositions. Specializes in fluorochemical synthesis, including new fluoromonomers and fluoropolymers; proficient with high-pressure reaction equipment, continuous distillation processes, and continuous-flow vapor phase reactors. Partners with internal and external stakeholders to translate new product requests into sustainable manufacturing processes.

Areas of Expertise

Research / Development • Process Design • Polymer & Organic Synthesis / Characterization
Laboratory Operations • Product Development • Commercial Scale-Up • Competitive Intelligence
Workplace Safety / Health • Industry Trend Analysis • Cross-Functional Leadership • Project Management

PROFESSIONAL EXPERIENCE

CHEMOURS COMPANY (DuPont), Wilmington, DE

Apr 2007 – Jun 2015

Principal Investigator, Fluorochemicals R&D

Directly involved in the synthesis, characterization, and commercial process development of next generation non-flammable, non-ozone depleting, and low global warming potential refrigerants and specialty solvents.

- Spearheaded the development of new synthetic processes to intermediates for 1234yf production with substantial automotive and stationary applications in the \$1.5B refrigerant-gas market space
- Invented Vertrel® HFX-110; designed commercial manufacturing processes to fill a \$150M market space with applications in precision cleaning, heat transfer, and electronics manufacturing

DUPONT, Wilmington, DE

Aug 2000 – Apr 2007

Senior Research Chemist, Fluoroproducts / Fuel Cells R&D

Vital member of the research and development team; led the synthesis and characterization of new Nafion®-like fluoropolymers with enhanced conductivity and fabrication of new composite and cross-linked membranes with improved swelling stability for PEM fuel cells.

- Facilitated re-formulation, process development, and commercial scale-up for Nafion® PFSA polymer dispersions in a \$250M market space for manufacturing chloroalkali separators and fuel cell membranes
- Designed processes for dispersions of fluoropolymers with sulfonyl fluoride functionality in organic solvents
- Achieved the first absolute molecular weight and distribution characterization of Nafion® PFSA using SEC-LS

BALLARD POWER SYSTEMS, Burnaby, Canada

Sep 1991 – Jul 1995

Research Associate, Ballard Advanced Materials

Key contributor in the synthesis and characterization of new conductive monomers based on trifluorostyrene and emulsion polymerization; resulted in partially fluorinated polymers and membranes for PEM fuel cell applications.

EDUCATION

PhD in Polymer Chemistry, University of Toronto

Thesis: Synthesis of Novel Fluoropolymers – polymerization in super-critical carbon dioxide, solution, and emulsion including tetrafluoroethylene as a co-monomer.

Master of Science in Organic Chemistry, University of Toronto

Thesis: Synthesis of Novel Fluoromonomers – tetrafluoroethylene synthesis and new monomers therefrom.

Bachelor of Science in Chemistry, Honors, Simon Fraser University

Patent Owner's Ex. 2003

Arkema v. Honeywell

IPR2015-00916

Page 1

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Page 2 | (302) 332-6494 | lousenrd2@outlook.com

TECHNICAL SKILLS

- Proton exchange membrane development for fuel cells from conductive fluoropolymers/dispersions
- Extensive exposure to analytical characterization techniques, including SEC-LS, SEC-MALLS, GPC, HPLC (analytical and preparatory), GC/GCMS, UV-Vis, FTIR, and NMR
- Knowledgeable with DSC, TGA, ICP, and AA

CERTIFICATIONS & AWARDS

- Six Sigma Green Belt, DuPont, Apr 2003
- Martin Walmsley Fellowship for Technological Entrepreneurship (\$100k) – awarded in 2000 to formally develop a business plan that was based on my graduate research

SELECTED PUBLICATIONS & PATENTS

1. Nappa M. J., **Lousenberg R. D.**, Jackson A., Synthesis of 1,1,3-trichloro-1-propene, *United States Patent* 8,586,804, 2013
2. Nappa M. J., **Lousenberg R. D.**, Jackson A., Synthesis of 1234yf by selective dehydrochlorination of 244bb, *United States Patent* 8,263,817 B2, 2012
3. Bartelt J. E., **Lousenberg R. D.**, Alkyl perfluoroalkene ethers, *United States Patent* 8,399,713, 2013
4. **Lousenberg R. D.**, Process for separating components in alkyl perfluoroalkene ether production, *United States Patent* 8,592,630, 2013
5. **Lousenberg R. D.**, Process to prepare fluoropolymer dispersions and membranes, *United States Patent* 8,058,319, 2011
6. **Lousenberg R. D.**, Molar mass distributions and viscosity behavior of perfluorinated sulfonic acid polyelectrolyte aqueous dispersions, *Journal of Polymer Science Part B: Polymer physics*, 2005, 43(4), 421 – 428
7. Curtin D., **Lousenberg R. D.**, Henry T. J., Tangeman P. C., Tisack M. E., Advanced materials for improved PEMFC performance and life, *Journal of Power Sources*, 2004, 131, 41 – 48
8. Stone S., Steck A. E., **Lousenberg R. D.**, Substituted trifluorostyrene monomeric compositions, *United States Patent* 5,684,192, 1997
9. Stone S., Steck A. E., **Lousenberg R. D.**, Substituted trifluorostyrene compositions, *United States Patent* 5,602,185, 1997
10. **Lousenberg R. D.**, Shoichet M. S., Synthesis of linear poly(tetrafluoroethylene-co-vinyl acetate) in carbon dioxide, *Macromolecules*, 2000, 33, 1682 – 1685
11. **Lousenberg R. D.**, Shoichet M. S., Polymerization of novel trifluorovinyl ethers: Insight into the mechanism of termination and chain transfer, *Journal of Polymer Science Part A: Polymer Chemistry*, 1999, 37, 3301 – 3308
12. **Lousenberg R. D.**, Shoichet M. S., Synthesis of trifluorovinyl ethers incorporating functionalized hydrocarbon ether groups: Insight into the mechanism of trifluorovinyl ether formation from trimethylsilyl 2-alkoxy-2,3,3,3-tetrafluoropropionates, *The Journal of Organic Chemistry*, 1997, 62(22), 7844 – 7849