Joel McCloskey

Research and Development / Mechanical Engineer

Philadelphia, PA - Email me on Indeed: indeed.com/r/Joel-McCloskey/a06b55eb59cc52e3

Authorized to work in the US for any employer

WORK EXPERIENCE

Research and Development Engineer

LithChem Energy / Retriev Technologies - June 2002 to August 2015

Designed and built equipment for lab scale production of several high-purity lithium salts used in battery applications. Developed SOPs for the laboratory production of these materials. Scaled up production of these lithium salts from lab scale to commercial scale, selecting process equipment and implementing techniques to allow for process simplification and debottlenecking.

• Designed and built process systems to purify and dry solvents used in lithium battery electrolytes. This lowered costs by purchasing standard-purity solvents and highly purifying them as needed. Designed and built unique product crystallizer for lithium salt production.

• Designed custom heating mantles and inert gas enclosures for lab scale chemical reactions.

• Designed and built iris ports for inert atmosphere glove boxes, eliminating cumbersome gloves which improved manual dexterity and simplified movement of tools and materials for battery cell assembly.

• Designed and built equipment for making lithium hexafluorophosphate (most commonly used and most difficult to make lithium battery salt), including designing custom reactors for handling the corrosive starting materials. Designed and built distillation process equipment and spent-chemical recovery apparatus. Designed and implemented unique final product filtration system that maximized yield and reduced process time. Streamlined final product drying and packaging procedures. This process produced the highest purity lithium hexafluorophosphate in the world at the time.

• Developed procedures for producing, storing, and delivering samples of the final product battery salt and high purity battery electrolytes to customers.

• Performed extensive conductivity testing on battery electrolytes at extremely low temperatures using custom-built apparatus and dry ice baths.

• Assisted in design of lithium hexafluorophosphate salt manufacturing facility in Tulsa, OK including process scale-up and equipment selection.

• Developed unique activated resin application for extracting acid impurities from 'out-of- spec, high acid' lithium-ion battery electrolytes. Designed specialized equipment to correct electrolyte processing errors to reduce acid impurities from >1,000 PPM down to undetectable levels, making the electrolyte acceptable for use. Also designed and marketed this device to other lithium-ion battery electrolyte manufacturers.

• Designed and built equipment for lab-scale production of several high purity quaternary salt compounds for the ultracapacitor industry. Also provided samples of these ultracapacitor salts and their electrolytes to customers; electrolyte sample production ranged from one liter to several hundred liters.

• Designed and implemented a cryogenic vacuum containment system for generating and storing phosphorus pentafluoride (PF5), a highly sensitive gas. The captured gas was
then stored for shipment to potential customers. (I am a certified haz-mat shipper)
• Developed procedures for making materials and components for lithium-ion batteries and ultracapacitor cells. Successfully designed and integrated a precision low-cost
slitter into existing process equipment. This slitter adaptation was critical for successfully producing cylindrical style batteries on commercial scale battery cell
assembly equipment. Produced both flat prismatic and cylindrical style batteries and ultracapacitors for internal and outside testing.

Research and Development Engineer

American HyPerform Inc - June 1992 to May 2002

Developed specialized grip material for cut-resistant gloves. Also designed testing and material selection apparatus, specialized packaging and delivery system. Developed
water-repellant coating techniques for Kevlar gloves using Teflon suspensions.
• Designed and implemented prototype device for producing gathered elastic cuffs on disposable protective suits using a synchronized interlocking jig and specialized hot-melt
materials.
• Developed a medicinal/antibacterial protective dip coating used in the dairy cattle
industry in conjunction with Iowa State University. This dip coating system protected and medicated cow udders in cows at risk of infection.
• Designed prototype puncture-resistant laminated multi-layer icepick-proof protective vest
material.
• Extensive laboratory experience in carbon fiber vacuum sealing and light cured resin
technology.
• Developed procedure for implementing gas-tight bonded Teflon face shields into Level A
(highest protection level) HAZMAT suits. Developed etching treatment procedures for
Teflon face shield perimeter to allow for proper bonding. Designed and built face shield
heat-sealing device that simultaneously sealed all the face shield edges to the suit
material.
• Assisted in development of a variety of biocide cleaners, including formulation,
production, packaging and distribution.
• Developed dust-resistant coating for lithium hydroxide, a main ingredient in lithium
greases. The coating eliminated the choking dust that emanates from lithium hydroxide,
improving the ease of manufacture of lithium greases.
• Produced specialized consumable single-use bagging material to allow bags of lithium
hydroxide to be added directly to process stream, helping to eliminate dusting problems.
• Developed intermediate grease products for the lithium grease industry to shorten
production batch times.

Mechanical Engineering Co-op Intern

AMP Incorporated - April 1989 to September 1991

• Assisted design and implementation of improved tooling for older pin-style connector
assembly machines. This allowed for less downtime and more efficient production of existing connector styles for current customers of these parts.
• Spearheaded implementation of AutoCAD to the department in moving design and engineering from drawing board to CAD. Used AutoCAD 11 extensively for 3D
wireframing and dimensioning of new parts.

EDUCATION

B.S.
Mechanical Engineering Drexel University - Philadelphia, PA

PATENTS

Dust free lithium hydroxide (#5,948,736)
http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PALL&p=1&u=%2Fnetahtml%2FPTO%2Fsrchnum.htm&r=1&f=G&l=50&s1=5,948,736.PN.&OS=PN/5,948,736&RS=PN/5,948,736
September 1999
The present invention provides a method for forming dust free lithium hydroxide monohydrate. The method contains the step of coating the lithium hydroxide with 0.1 to 5% by weight of low melting or liquid fatty acids or esters and triglycerides of fatty acids.

Pouched ingredients for preparing greases (#6,153,563)
http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PALL&p=1&u=%2Fnetahtml%2FPTO%2Fsrchnum.htm&r=1&f=G&l=50&s1=6,153,563.PN.&OS=PN/6,153,563&RS=PN/6,153,563
November 2000
A sealed pouch of a single layer polyolefin film having a thickness of from about 0.005 to 0.001 inch and a melting point below about 280°F. which is soluble in a lubricating oil base. The pouch contains a solid lithium hydroxide or lithium fatty acid salt or mixtures thereof for use in preparing greases.

Hazardous environment protective garments having a fusion bonded optically transparent facepiece with olefin terpolymer seams (#6,302,993)
http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PALL&p=1&u=%2Fnetahtml%2FPTO%2Fsrchnum.htm&r=1&f=G&l=50&s1=6,302,993.PN.&OS=PN/6,302,993&RS=PN/6,302,993
October 2001
The invention provides a process, and product thereof, for forming a chemically resistant fusion bonded between chemically dissimilar materials by use of an acid-based terpolymer for protective garments. The olefin terpolymers are preferably copolymers of an olefin, an acid and an ester. The process involves placing the olefin terpolymer film between two dissimilar films such as a facepiece and the fabric material of the garments and applying heat and pressure. The resulting fusion bonded film composite is strong, flexible and upon the application of sufficient stress exhibits total cohesive rupture failure.

Preparation of phosphorus pentafluoride (#6,322,764)
http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PALL&p=1&u=%2Fnetahtml%2FPTO%2Fsrchnum.htm&r=1&f=G&l=50&s1=6,322,764.PN.&OS=PN/6,322,764&RS=PN/6,322,764
November 2001
A process for the preparation of anhydrous high purity phosphorus pentafluoride in high yield. The process uses an excess of hydrogen fluoride in a reaction with a phosphoric acid to form hexafluorophosphoric acid followed by reaction with a sulfur based acid reactant in a reaction medium containing an excess of hydrogen fluoride.

Hazardous environment protective garment having a fusion bonded optically transparent facepiece with chlorinated polyolefin seams (#6,364,980)
http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PALL&p=1&u=%2Fnetahtml%2FPTO%2Fsrchnum.htm&r=1&f=G&l=50&s1=6,364,980.PN.&OS=PN/6,364,980&RS=PN/6,364,980
April 2002
The invention provides a process, and product thereof, for forming a chemically resistant fusion bonded seal between chemically dissimilar materials by use of a chlorinated polyolefin film for protective garments. The

process involves placing the chlorinated polyolefin film between two dissimilar films such as a facepiece and the fabric film of the garment and applying heat and pressure. The resulting fusion bonded film composite is strong, flexible and upon the application of sufficient stress exhibits total cohesive rupture failure.

Dry powder lithium carboxylates (#6,399,801)

http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PALL&p=1&u=%2Fnetahtml%2FPTO%2Fsrchnum.htm&r=1&f=G&l=50&s1=6,399,801.PN.&OS=PN/6,399,801&RS=PN/6,399,801

June 2002

The invention provides a process for preparing lithium carboxylates which can be used in the preparation of soaps, oils and greases. The process utilizes molten carboxylic acids in a reaction utilizing a minimum of water and provides a powdery product which does not need filtration.

Stabilized lithium electrochemical cells containing an alkoxy silane (#6,416,906)

http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PALL&p=1&u=%2Fnetahtml%2FPTO%2Fsrchnum.htm&r=1&f=G&l=50&s1=6,416,906.PN.&OS=PN/6,416,906&RS=PN/6,416,906

July 2002

The inventory provides an electrolyte containing silane additive for the lithium-containing electrochemical cells and batteries.

Process for preparing tetrafluoroborate salt and intermediates thereof (#6,444,846)

http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PALL&p=1&u=%2Fnetahtml%2FPTO%2Fsrchnum.htm&r=1&f=G&l=50&s1=6,444,846.PN.&OS=PN/6,444,846&RS=PN/6,444,846

September 2002

There is provided a process for preparing tetraalkyl ammonium halide utilizing a catalytic amount of acetonitrile in a reaction under pressure and at an elevated temperature of an alkyl halide and a trialkyl halide and in which tetrafluoroborate can be subsequently prepared.

Non-aqueous electrolyte (#6,535,373)

http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PALL&p=1&u=%2Fnetahtml%2FPTO%2Fsrchnum.htm&r=1&f=G&l=50&s1=6,535,373.PN.&OS=PN/6,535,373&RS=PN/6,535,373

March 2003

A non-aqueous electrolyte for use in batteries and electrical capacitors for use at low temperatures. The electrolyte consists of at least two quaternary ammonium salts in a nitrile solvent.

Preparation of hexafluorophosphoric acid (#6,540,969)

http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PALL&p=1&u=%2Fnetahtml%2FPTO%2Fsrchnum.htm&r=1&f=G&l=50&s1=6,540,969.PN.&OS=PN/6,540,969&RS=PN/6,540,969

April 2003

The present invention provides a process for preparing hexafluorophosphoric acid complexed with about 1 to 3.3 molecules of water which are stable at temperatures below 20°C and the compositions prepared thereby.

Polycarbonate oligomers and polymers for use in electrolytes (#6,602,976)

http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PALL&p=1&u=%2Fnetahtml%2FPTO%2Fsrchnum.htm&r=1&f=G&l=50&s1=6,602,976.PN.&OS=PN/6,602,976&RS=PN/6,602,976

August 2003

There is provided novel polycarbonate polymers and oligomers for use as electrolytes in electrochemical devices having a higher content of organic carbonates so as to enhance electrical conductivity. The polymers are prepared by a condensation reaction or by ester exchange.

Preparation of arsenic pentafluoride (#6,635,231)

http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PALL&p=1&u=%2Fnetahtml%2FPTO%2Fsrchnum.htm&r=1&f=G&l=50&s1=6,635,231.PN.&OS=PN/6,635,231&RS=PN/6,635,231

October 2003

A process for the preparation of high purity arsenic pentafluoride in high yield. The process uses sulfur trioxide or oleum and an excess of hydrogen fluoride to react arsenic acid or arsenic pentoxide in a reaction medium containing an excess of hydrogen fluoride to yield high purity arsenic pentafluoride as a gas.

Dust free lithium hydroxide (#6,653,262)

http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PALL&p=1&u=%2Fnetahtml%2FPTO%2Fsrchnum.htm&r=1&f=G&l=50&s1=6,653,262.PN.&OS=PN/6,653,262&RS=PN/6,653,262

November 2003

The present invention provides a method for forming dust free lithium hydroxide monohydrate. The method contains the step of coating the lithium hydroxide with 0.2 to 1.5% by weight of paraffinic oils.

Non-aqueous electrolyte (#6,728,096)

http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PALL&p=1&u=%2Fnetahtml%2FPTO%2Fsrchnum.htm&r=1&f=G&l=50&s1=6,728,096.PN.&OS=PN/6,728,096&RS=PN/6,728,096

April 2004

A non-aqueous electrolyte for use in batteries and electrical capacitors for use at low temperatures. The electrolyte consists of at least two electrolyte salts in an electrochemical solvent or at least one electrolyte salt in a mixture of electrochemical solvents.

Non-aqueous electrolytes for electrical storage devices (#6,902,684)

http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PALL&p=1&u=%2Fnetahtml%2FPTO%2Fsrchnum.htm&r=1&f=G&l=50&s1=6,902,684.PN.&OS=PN/6,902,684&RS=PN/6,902,684

June 2005

A non-aqueous electrolyte for electric storage devices consisting of a nitrile solvent and a complex salt formed by the reaction of a tetraalkyl ammonium salt and hydrogen fluoride. The electrolyte may include a component which a cation of an imidazolium or quaternary tetraalkylammonium salt.

Low temperature non-aqueous electrolyte (#7,675,737)

http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PALL&p=1&u=%2Fnetahtml%2FPTO%2Fsrchnum.htm&r=1&f=G&l=50&s1=7,675,737.PN.&OS=PN/7,675,737&RS=PN/7,675,737

March 2010

The present invention provides electrolytes for use in electronic devices at temperature below -50°C consisting of a mixture, eutectic or ter-eutectic of at least two low viscosity aprotic solvents, acetonitrile, and a mixture of conductive salts having a molecular weight up to 240.

Process for preparing lithium manganate (#7,713,313)

http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PALL&p=1&u=%2Fnetahtml%2FPTO%2Fsrchnum.htm&r=1&f=G&l=50&s1=7,713,313.PN.&OS=PN/7,713,313&RS=PN/7,713,313

May 2010

The present invention provides a process for preparing lithium manganate having lithium-in cell stability by utilizing manganese oxides having lower oxidation states in the furnacing step and by using stoichiometric amounts of lithium hydroxide monohydrate and a manganese oxide in water as a starting mixture. Cr, Ni, Mg, AL oxides are optionally added.

Process for preparing lithium ion cathode material (#7,829,223)

http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PALL&p=1&u=%2Fnetahtml%2FPTO%2Fsrchnum.htm&r=1&f=G&l=50&s1=7,829,223.PN.&OS=PN/7,829,223&RS=PN/7,829,223

November 2010

There is provided a process for preparing lithium cobaltate and to lithium-containing cobalt oxides which is used in lithium battery cathodes. Also, there is provided cathodes for lithium batteries.

Carbon electrodes and electrochemical capacitors (#7,924,549)

http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PALL&p=1&u=%2Fnetahtml%2FPTO%2Fsrchnum.htm&r=1&f=G&l=50&s1=7,924,549.PN.&OS=PN/7,924,549&RS=PN/7,924,549

April 2011

Carbon electrodes for a capacitor having conditioned carbon elements in combination with a high concentration of an electrolyte tetrafluoroborate salt and a non-aqueous aprotic solvent to provide an operational voltage up to 4.5V and capacitors used with the carbon electrodes.

Carbon electrodes and electrochemical capacitors (#7,986,510)

http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PALL&p=1&u=%2Fnetahtml%2FPTO%2Fsrchnum.htm&r=1&f=G&l=50&s1=7,986,510.PN.&OS=PN/7,986,510&RS=PN/7,986,510

July 2011

An electrochemical device having an operational voltage up to 4.5 V in combination with a high concentration of an electrolyte salt consisting of a tetrafluoroborate salt and a eutectic of two solvents in which ethylene carbonate is one and an improved carbon electrode a preferred electrochemical device is a capacitor.

Non-aqueous electrolyte (#8,128,833)

http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PALL&p=1&u=%2Fnetahtml%2FPTO%2Fsrchnum.htm&r=1&f=G&l=50&s1=8,128,833.PN.&OS=PN/8,128,833&RS=PN/8,128,833

March 2012

The present invention provides electrolytes for use in electronic devices which contain imidazolium salts in combination with high boiling aprotic solvents having lower flammability and lower toxicity than acetonitrile electrolytes.

Electrolyte solution for capacitors and batteries (#8,785,057)

http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PALL&p=1&u=%2Fnetahtml%2FPTO%2Fsrchnum.htm&r=1&f=G&l=50&s1=8,785,057.PN.&OS=PN/8,785,057&RS=PN/8,785,057

July 2014

The present invention provide novel compounds and electrolyte solutions which can be used in capacitors and lithium batteries and which have a liquidus range of from about -65°C to about 171°C.

Capacitors having conditioned carbon for electrodes (#9,034,517)

http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PALL&p=1&u=%2Fnetahtml%2FPTO%2Fsrchnum.htm&r=1&f=G&l=50&s1=9,034,517.PN.&OS=PN/9,034,517&RS=PN/9,034,517

May 2015

There is provided an improvement for capacitors having activated carbon electrodes by the use of an electrolyte solution containing a carbonate of the formula RO(C.dbd.O)OR.sup.1 and a conductive salt such as a lithium salt or a quaternary ammonium salt at a concentration of from 0.6 to 3 mol/l.