Virtual Battery Seminar

11-14 January 2021

- 8 hours training

Shmuel De-Leon Energy invites you to join 8 hours battery virtual seminar taking place as 4 parts of 2 hours each on 11-14 January 2021

Registration to seminar 4 parts (Parts 1-4) - $599 per person
Registration to Battery Safety Training (Part 3 only) - $299 per person
Registration to Prologium – Solid Electrolyte batteries (Part 4 only) - $299 per person

---

11 January, 2021 - Part 1 - (2 hours) - starting at 16:00 PM Central Europe Time, 10:00 AM EST USA Time

Part 1 includes 2 sections - Battery Essentials and Primary Batteries

12 January, 2021 - Part 2 - (2 hours) - starting at 16:00 PM Central Europe

Time, 10:00 AM EST USA Time

Part 2 includes 2 sections - Rechargeable batteries and battery Packs Design

13 January, 2021 - Part 3 - (2 hours) - starting at 16:00 PM Central Europe Time, 10:00 AM EST USA Time

Part 3 includes 1 section - Battery Safety Training

14 January, 2021 - Part 4 - (2 hours) - starting at 16:00 PM Central Europe Time, 10:00 AM EST USA Time

Part 4 includes 1 section – Prologium Technology – Solid state battery technology progress and its' advantages toward EV application

* Registered attendants will receive the training presentation (Presentations are confidential for internal use only)

Training Syllabus:

Battery Essentials

- Battery History
- The strong need for batteries
- Cells & Battery Packs
- Cells classifications
- Internal cell components
- Anode and cathode structure
- Cell components affecting energy density
- Charge - Discharge operation
- Cells - Button & Coin Cells Shape
- Cells - Hard Case Cylindrical Shape

- Cells - Hard Case Prismatic Shape
- Cells - Prismatic Pouch Shape
- Batteries/Cells Standardization
- Cells - Common Size
- Cells Internal Construction - Bobbin and Spiral Types
- Li-Ion Energy Ver. Power Cell (Flat Plate Construction)
- Cells Internal Construction - Pin Type
- Cells Internal Construction - Flat Plates Type (Stacking)
- Cells Internal Construction – Flat Wound Type
- Cells Internal Construction – Z-Folding
- Cells – Internal Construction Thin Film Type
- Cells - Case Polarity, Seals
- Cell Voltage Definitions
- Internal Resistance/Impedance
- Operating Temperature – What Does it Mean?
- Storage Temperature
- Shelf Life, Cycle Life, Service/Calendar Life
- Factors Affecting Aging and State of Health
- Recommended Battery Storage Conditions
- State of Charge – State of Health
- What is a C-Rate (Apply to Charge and/or Discharge)
- Energy & Power Density

Primary Batteries

- Primary Batteries Characteristics
- Why Still Talk About Primary Battery?
- Commercial Primary Cells Energy Density Comparison
- Zinc Chloride and Zinc Carbon- (Heavy Duty)
- Alkaline Manganese Dioxide – Zn/MnO_2
- Alkaline Manganese Dioxide Cells – Bobbin Construction
- Alkaline Thin Film Flexible Batteries
- Silver Oxide (Zinc) – Zn/Ag_2O

- Discharge Profile: Silver Oxide & Alkaline Button Cells
- Lithium Primary Cells
- Why Lithium?
- Theoretical Energy Densities Of Battery Chemical Couples
- Lithium Cell Advantages
- Lithium Cell Limitations
- Lithium Primary Cells Electrolyte Classification
- Lithium Passivation
- High Temperature (> 100 Deg C) Lithium Battery Applications
- Lithium Iron Disulphide Li/FeS2
- Lithium Manganese Dioxide Li/MnO2
- Thin Film Primary Batteries
- Lithium Carbon Mono Fluoride Li/CFx
- Ultralife – Li/CFx-MnO2
- Lithium Thionyl Chloride LI/SOCl2
- Lithium Sulfuryl Chloride Li/so2cl2
- High Power Lithium Organic Cell (TLM series)
- Tadiran Low TMV Lithium Thionyl Chloride Cells (TRR)

Rechargeable Batteries

- Why Rechargeable Batteries?
- Rechargeable Chemistries
- Lead Acid Batteries, Advantages, Limitations
- Industrial Lead Acid Cells
- Lead Acid Batteries Storage Conditions
- Nickel-Cadmium Batteries, Advantages, Limitations
- Nickel-Metal Hydride Batteries, Advantages, Limitations
- “Ready to Use” Nickel-Metal Hydride Batteries
- Rechargeable Lithium Batteries and systems
- Best Performance Cells
- Lithium Rechargeable Cells Electrolyte Types
- Li-Ion Hard Case Cells Advantages, Limitations,

- Hard Case Cylindrical Cells, 18650, 21700
- The Need for Larger Lithium Ion Cylindrical Cell Sizes
- Tesla 21700 Cells
- Hard Case Prismatic Cells
- Hard Case Button Cells
- Li-Ion Pouch Cells Soft Packaging, Advantages, Limitations
- Li-Ion Liquid Electrolyte Pouch Cells
- Ballooned Li-Ion Pouch Cells (Swelling - Gassing)
- Li-Ion Cylindrical Pouch cells
- Jenax Flexible Li-Ion Cells
- Li-Ion Cylindrical Cell with Silicon Nano Structure Anode
- Lithium Iron Phosphate Batteries, Advantages, Limitations
- Why LFP is Highly Safe?
- Lithium Werks LFP Batteries
- LFP as a Replacement to Lead-Acid Batteries
- Li-Ion High Voltage Cells, Advantages, Limitations
- High Power Li-Ion High Voltage Cells
- Solid State Batteries, Advantages, Limitations
- LTO Cells, Advantages, Limitations
- Lithium Dendrite During Low Temperature Charging
- Toshiba LTO Battery - SCiB
- Lithium Sulfur/Metal Rechargeable Cells
- What Prevents the Implementation of Li-Sulfur?
- Oxis Energy Li-S Cells
- Sion “Licerion” Li- Metal Cells
- Potential Break- Through Rechargeable Battery Technologies

Battery Pack Design

- Battery Packs – The Need
- Battery Pack Components
- Cells Used in a Battery Pack
- Resistance & Laser Spot Welding

- Connect: Aluminium Wire 0.4mm
- High Power Cells Connection
- Pouch Cells Connection
- PCM – Protection Circuit Modules. BMS – Battery Management Systems
- Battery Packs Internal Construction
- Battery Pack Insulation
- Potting for Adding Strength
- Geometry And Topology
- Battery Pack Enclosures
- Guide for Battery Pack Design Requirements
- Battery Pack Design Process
- Cells Selection - Requirements
- Designed Capacity
- Cell Validation Tests
- Design for Safety
- BMS Systems Topologies
- Li-Ion Battery Packs Unbalancing
- Cells Balancing
- Safety Component Validation Tests
- Battery Packs Mechanical Design
- Mechanical Validation Tests
- Battery Pack Performance Tests
- Battery Certifications

Battery Safety

Batteries have become daily use components for many applications. New growing segments like EV and Grid storage batteries extend the traditional ordinary battery applications. In the race for energy density, we shouldn’t forget the safety – as an example the Samsung Galaxy Note 7 battery safety case. Unfortunately, we face daily safety events with injuries and severe damage. This tutorial focuses on portable, stationary, and automotive battery safety along the battery cycle life (acceptance, testing, assembly, use, transportation,

and disposal). The training incorporates Shmuel De-Leon's and other experiences on battery safety representing over 30 years of work in the field. The motivation behind the training is to provide attendees with the knowledge needed to safely handle the batteries in their organization and to support reduction in safety events.

Topics to be covered:

• Battery Safety Hazards – Movies and examples

• Battery Safety Guidelines – recommendations on proper work with batteries (Acceptance, testing, battery pack design, use, transportation, disposal)

• What to do in case of a battery safety event - Recommendations

• Battery Safety Equipment – Check list for labs and warehouses

Prologium Technology – Solid Electrolyte Li-Ion Batteries – **Presented by Mrs. Lisa Hsu**

- Solid state battery technology progress and its' advantages toward EV application.
- Recently, EVs spontaneous combustion and recall frequently, so lithium battery safety problem becomes the key topic among EV OEMs and battery cell makers since battery is a major component of EVs.
  During this speech, Lisa will set forth the progress and future vision of current solid-state technology and advantages of adopting on EV applications based on Prologium solid state technology status.

About Shmuel De-Leon:
Shmuel De-Leon is Founder and CEO of Shmuel De-Leon Energy, Ltd.
Shmuel is a leading international expert in the business of batteries.
Prior to founding the company, Shmuel held for over 20 years various positions as a battery, engineering and
quality control team manager. Shmuel holds BSc. in mechanical engineering from Tel-Aviv University and MBA in quality control and reliability engineering from the Technion Institute in Haifa as well as an Electronic Technician's diploma.

Shmuel De-Leon/CEO
Shmuel De-Leon Energy, Ltd.
Mazal Arie 10, Hod-Hasharon, Israel 4536045
Tel/Fax: 972-77-5010792
Mobile: 972-52-8601517
E-Mail: shmuel@sdle.co.il
Company web site: www.sdle.co.il
Battery DataBase web site: www.batteriesdatabase.com
Signup for our weekly battery newsletter

Our mailing address is:
Shmuel De-Leon Energy. Ltd
Mazal Arie 10
Hod-Hasharon 45309
Israel