



Battery Seminar, 8-9 September 2020 - Virtual - 4 hours training



Shmuel De-Leon Energy invite you to join 4 hours battery virtual seminar taking place as 2 parts of 2 hours each on 8-9 September 2020 -

[Program & Registration](#)

8 September, 2020 - Part 1 - (2 hours) - starting at 15:00 AM Central Europe Time, 10:00 AM EST USA Time

Part 1 include 2 sections - Battery Essentials and Primary Batteries

9 September, 2020 - Part 2 - (2 hours) - starting at 15:00 AM Central Europe Time, 10:00 AM EST USA Time

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

* Training attendants will receive the training presentation (Presentation 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/MnO₂
- Alkaline Manganese Dioxide Cells – Bobbin Construction
- Alkaline Thin Film Flexible Batteries
- Silver Oxide (Zinc) – Zn/Ag₂O
- 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 Disulfide Li/FeS₂
- Lithium Manganese Dioxide Li/MnO₂
- Thin Film Primary Batteries
- Lithium Carbon Mono Fluoride Li/CF_x
- Ultralife – Li/CF_x-MnO₂
- Lithium Thionyl Chloride LI/SOCl₂

- Lithium Sulfuryl Chloride $\text{Li/SO}_2\text{Cl}_2$
- 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
- HighPower 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: Aluminum 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
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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.

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