



# Li-Ion Cells Manufacturing Virtual Seminar 15-16 February 2023 – 7 hours training



Shmuel De-Leon Energy invites you to join 8 hours battery virtual seminar taking place on 15-16 February, 2023 – [Registration to seminar - \\$599 per person](#)

- Contact us for group or flat company registration discount

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**14 February, 2023 - Part 1 - (3 hours) - starting at 16:00 PM Central Europe Time,  
10:00 AM EST USA Time**

Part 1 includes 3 sections - Battery Essentials, Rechargeable Batteries, Li-Ion Cells design and manufacturing (Basics)

**16 February, 2023 - Part 2 - (4 hours) - starting at 16:00 PM Central Europe Time,  
10:00 AM EST USA Time**

Part 2 includes 3 sections – [Univercell](#) (Germany) Li-Ion Cells design and manufacturing (Advanced), [Solith](#) (Italy) – Li-Ion cells manufacturing automation (Prototype and mass production automation), [Keysight](#) presentation on li-ion cells forming.

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

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Training Syllabus:

**Battery Essentials – Speaker; Shmuel De-Leon**

- 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

### **Rechargeable Batteries – Speaker; Shmuel De-Leon**

- 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

### **Li-Ion Rechargeable cells design and manufacturing (Basic) – Speaker; Shmuel De-Leon**

- High Energy Li-Ion Cell Materials Design
- High Power Li-Ion Cell Materials Design
- Cells Supply Chain – Materials content
- Li-Ion Hard Case Cells Manufacturing Process
- Li-Ion Soft Case (Pouch) Cells Manufacturing Process
- Slurry Preparation Process
- Critical Steps in Slurry Preparation
- Electrode Coating
- Burrs can Cause Safety Failures
- Electrode Drying and Sizing
- Electrode Compressing and Slitering
- Cell Assembly – Stacking
- Electrolyte Filling
- Cell Formation, Aging and Grading
- Key Elements for Quality
- Cylindrical Cells Production
- Prismatic Cells Production
- Pouch Cells Production
- Quality Control of Pouch Cells Assembly

### **Univercell (Germany) – Li-Ion Cells Manufacturing – Speaker: Mr. Stefan Permien**

#### Topic 1

- Material choices in battery design Including Electrode optimization for function  
Capacity matching and cell design
- Introduction to battery active material
  - o Electrodes and battery chemistry
  - o Separators and electrolytes
  - o

#### Topic 2

- o Processes
  - Electrode Manufacturing
  - o Material preparation and mixing
  - o Roll-to-roll coating
  - o Drying, calendaring, and other steps in final electrode preparation

- Battery cell assembly
- o Pouch
- o Cylindrical
- Prismatic

**Solith (Italy) – Solith Pilot and Mass Production Equipment for Li-Ion Cell Assembly –  
Speaker: Mr. Yves Doessant**

- Automation for Li-Ion Assembly
- Solith Pilot Line
- Laboratory Winder (Prismatic and Cylindrical)
- Prismatic Lithium Winder
- Roll to Roll Notching Machine
- Things to know about assembly
- Large Scale Formation
- Things to Know Formation
- Battery test Equipment
- Integrated Pouch Cell Assembly Line

**Keysight (USA) – Li-Ion Cells Forming – Speaker: Mr. Bob Zollo**

Outline

- What is formation?
- What are the differences between forming and testing?
- Overview cell finishing process
- Forming in R&D, in Pilot, in custom, in high volume manufacturing
- Equipment flexibility requirements
- Building a forming system
  - o The first step: Tray size
  - o Contacting
  - o Pressure trays
  - o Wire size, length
  - o Mechatronics
- Process steps
  - o Pre-charge
  - o Formation charge rates and protocols
  - o Measurements and grading
    - Aging / Delta-OCV /Self Discharge
    - ACIR, DCIR
    - EIS
- Energy recovery/regeneration and true energy usage
- Temperature control
- Safety
- Software



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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