

What is a lithium metal oxide battery and how does it work?

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Sol Jacobs, VP and GM, Tadiran Batteries

What is a lithium metal oxide battery?

A lithium metal oxide (LMO) battery is a specialized form of primary (non-rechargeable) cell developed for use in certain medical, military and industrial applications that require a self-contained power source that is small and lightweight, yet capable of delivering high pulses and high rates of continuous power even after prolonged storage.

Available in both high power and medium power varieties, LMO batteries are constructed with a carbon-based anode, a multi-metal oxide cathode and an organic electrolyte, delivering up to 20-year operating life with an annual self-discharge rate of less than 1% per year. These small but powerful cells feature a nominal voltage of 4 V and up to 2 Wh of energy, with a discharge capacity of 135 mAh to 500 mAh, capable of handling 5 A continuous loads and 15 A maximum pulses. They also feature a wide temperature range (-55 °C to 85 °C) and a hermetic seal for added safety.

LMO batteries are UL-recognized for safety, with solvents that are non-toxic and non-pressurized and anode materials that are less reactive than standard lithium cells. These batteries have performed well in safety tests for nail penetration, crush, high temperature, short circuit, and overcharge.

How does it work?

The unique performance characteristics of an LMO battery is ideally suited for medical applications that require continuous high-rate power, instant activation and exceptionally long shelf life. These



[Image from Tadiran Batteries]

applications include:

- Automatic external defibrillators
- Surgical power tools
- Infusion pumps
- Bone growth stimulators
- Handheld medical devices

For example, surgical device manufacturer BioAccess chose high energy LMO batteries as an optional upgrade versus an alkaline battery pack to enable their surgical drill to become smaller, lighter and more ergonomic.

By substituting 6 AA-size TLM-1550HP LMO batteries for the alkaline battery pack, the BioAccess surgical drill achieved a 60% reduction in weight and volume while at the same time improving overall power and performance. An equivalent alkaline battery pack would have required three times the weight and 2.5 times the volume (15 AA-size alkaline batteries vs. 6 AA-size TLM-1550-HP batteries).

The TLM-1550HP batteries delivered an open circuit voltage (OCV) of 4.1 V along with high pulses of up to 15 A with 5 A maximum continuous load. Use of these powerful little batteries also enabled the BioAccess surgical drill to achieve faster drilling speeds, more active drill time (30 to 40 seconds at a time for up to 20 to 30 cycles), more instantaneous power and greater stall torque, thus resulting in more efficient drilling cycles with less operator fatigue.

The high pulse and high rate discharge characteristics and prolonged storage life of an LMO cell are also ideal for powering automatic external defibrillators (AEDs) that can stand idle for years but must perform reliably in life-saving situations.