

Leyden Energy Batteries Live Longer with LiTFSI Electrolytes

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Leyden Energy (Leyden) is a Silicon Valley company that has developed a lithium ion battery that uses imide salts as electrolytes instead of the more commonly used PF6-based electrolytes. Formerly known as Mobius Power, Leyden built its Li-imide battery platform on seed technology from a patent acquired by DuPont.

In addition to the DuPont patent, Leyden owns at least one U.S. patent and at least six pending applications. U.S. Patent No. 8,221,915 is entitled "High performance lithium or lithium ion cell" ('915 Patent) and directed to lithium ion electrochemical cells comprising a case (100), a cover (200), which is the positive terminal, and an insulating ring (300) between the case and the cover.

A negative tab (400) connects the anode current collector to the cover, and a positive tab (500) connects the cathode current collector to the cover. The cell also includes a positive terminal (550), a cathode (600), an anode (700), a separator (800), and an electrolyte solution inside the pores of the electrodes and separator.

The cathode (600) comprises an active material and a current collector made of aluminum foil with a protective, conductive coating, and the anode (700) comprises an active material and a copper foil current collector.

The crux of the '915 Patent is the invention of a way to reduce the corrosion typically caused by lithium imide salts so their properties of superior thermal and hydrolytic stability can be harnessed to extend the life of the battery. According to the '915 Patent, Leyden's unique combination of conductive protective coating and anti-corrosion additives achieves this goal:

The following examples describe and explain how synergy of conductive protective coating and corrosion inhibiting additives results in [the] possibility of using thermally stable salts described herein to achieve long battery cycle life with little degradation.

In particular, an electrolyte solution of Lithium bis(Trifluoromethanesulfonyl)Imide (LiTFSI) with the additive lithium bis(oxalato)borate significantly reduced corrosion over a one week testing period:

The corrosion of the protected samples did not occur with the whole duration of the test (one week). This surprising finding shows the synergetic effect of using the protective coating and the corrosion inhibiting additive allows reduction or prevention of corrosion of the current collector corrosion.

This Greentech Media article notes Leyden's claims that the lithium-imide electrolyte allows temperatures greater than convention lithium-ion batteries, longer cycle life, and higher charge density, and the follow-up piece reports on the company's latest funding round.

SOURCE Green Patent Blog