

Filling jigs in electrolyte filling systems



Key Requirements

- Chemical resistance against spills of electrolyte: 1.0M LiPF₆ in EC/EMC
- Dimensional stability – allowing precise positioning of dosing needles
- Wear resistance – maintaining original dimensions after heavy use
- Pollution safety – absence of metal or carbon fibers
- Fire safety – low flammability (preferably UL94 V-0)

Customer benefits

- Shortened development time, due to prequalification on chemical resistance to electrolyte
- Stable and long lasting performance during lifetime, due to low stress products and extreme wear resistance.

Our Recommendation

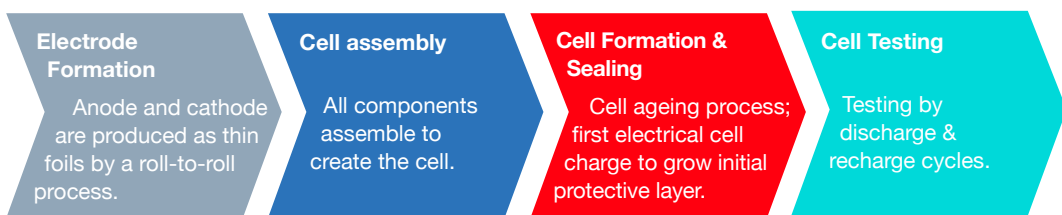
- Ertalyte® PET-P Natural
- Ertalyte® SLP PET-P Blue
- Ertalyte® TX PET-P Light Grey
- Ketron® 1000 PEEK Natural (brownish-grey)

Solutions for the cell assembly stage

Challenge

Rechargeable (“secondary”) batteries are a major enabler to electrify our society. Out of all rechargeable batteries, Lithium-ion Batteries (“LIB”) dominate the landscape due to their high energy density.

The LIB cell production process can be split in 4 major phases:



During the assembly phase, the anode, separator, cathode and another separator are stacked/wound into a jelly roll. This roll is inserted in casing to create the cell, which is then filled with electrolyte. As the electrolyte is highly reactive and chemically aggressive, the battery manufacturing equipment, such as dosing systems and filling jigs, needs to be chemically resistant. In close cooperation with experts within the Advanced Materials Division of the Mitsubishi Chemical Group (MCG), materials were tested against a standard type of electrolyte (please see backside of this flyer).

Functional Test: Retention of properties after chemical exposure to electrolyte.

| Retention of Tensile Strength and Tensile Strain at Break as a function of the hours of exposure (100% = no change) to 1.0M LiPF6 in EC/EMC at room temperature | | | | | | | |
|---|-------------|------------------|----------------------|----------------------|-------------------------|-----------------------|-------|
| Material | Price range | Tensile Strength | | | Tensile Strain at Break | | |
| | | 0hrs | 8hrs | 72hrs | 0hrs | 8hrs | 72hrs |
| Nylatron® MC907 PA6 Ertalon® 6PLA PA6 | \$ | 100 % | 97 % | 95 % | 100 % | 79 % | 85 % |
| Ertacetal® C POM-C Acetron® GP POM-C | \$ | 100 % | 99 % | 95 % | 100 % | 67 % | 29 % |
| Ertalyte® PET-P | \$ | 100 % | 100 % | 100 % | 100 % | 135 % | 117 % |
| TIVAR® H.O.T. UHMW-PE | \$ | 100 % | 99 % | 99 % | 100 % | NT | 104 % |
| Techtron® HPV PPS | \$\$\$ | 100 % | 99 % | 98 % | 100 % | NT | 96 % |
| Ketron® 1000 PEEK | \$\$\$\$ | 100 % | 99 % | 99 % | 100 % | NT | 114 % |
| NT = Not Tested | | best | 2 nd best | 3 rd best | average | 2 nd worst | worst |

Test conclusions

Tensile strength is not much affected by the electrolyte. Elongation at break is considered as most relevant test criteria, to judge possible embrittlement by chemical attack.

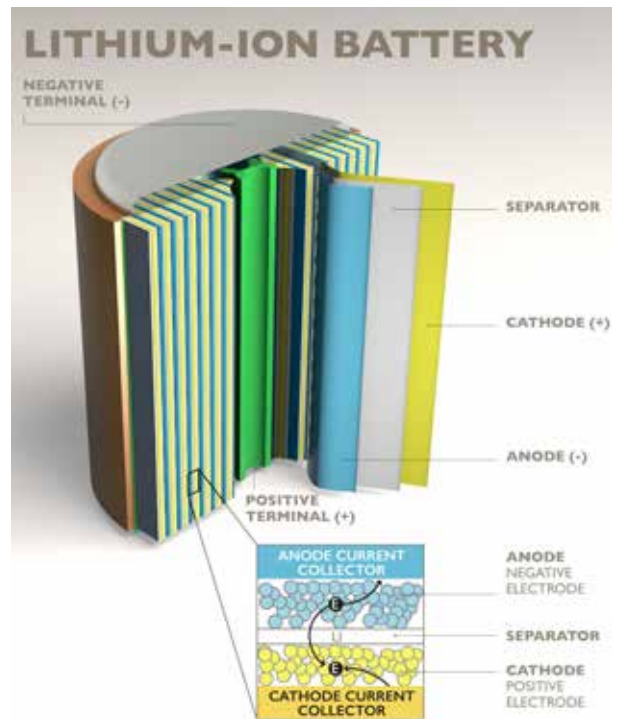
Materials that show degradation include:

- Nylatron® MC907 / Ertalon® 6PLA PA6
- Ertacetal® C / Acetron® GP POM-C

Materials that showed no, or little degradation are:

- Ketron® PEEK
- Techtron® HPV PPS
- TIVAR® H.O.T. UHMW-PE
- Ertalyte® PET-P (best overall performance)

As Ketron® PEEK and Techtron® HPV PPS are high temperature materials, they offer additional resistance to hot oven removal of remaining electrolyte, and also offer UL94 V0 flammability rating.



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