Celanese
The chemistry inside innovation™

Microporous Membranes in lithium ion batteries

Microporous membranes cover a nominal pore size range from 10 – 100 nm. Membranes in this range using GUR® UHMW-PE are further characterized by 30 to 60% void fraction or porosity and are typically between 5 and 20 µm thick. Base weights of such membranes are low due to the inherent specific gravity of the polymer and can range from 2 to 12 grams / square meter depending on thickness and porosity.

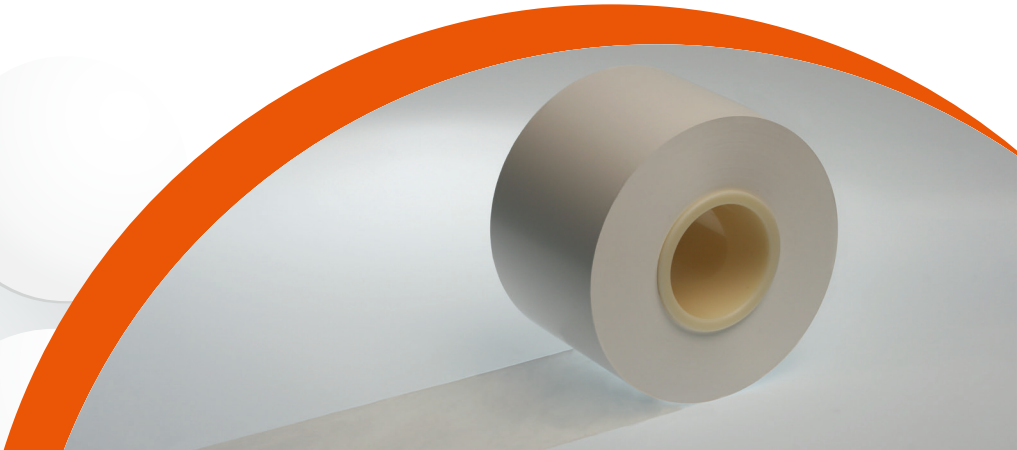


Celanese is a global leading supplier in production of ultra-high molecular weight polyethylene (UHMW-PE) in North America, Europe and Asia. We have dedicated UHMW-PE unit at our facilities under strict foreign body and metal ion control and have advanced lithium ion battery separator development at our laboratories in Frankfurt and Shanghai with laboratory-level extrusion, film-drawing equipment and comprehensive diaphragm testing capabilities. Our GUR® UHMW-PE portfolio covers a broad spectrum of molecular weights, particle sizes as well as different grain morphologies. This offers a rich set of options for manufacturers to choose from when searching for the right material for their particular process and performance targets.

Typical grades for the application

Properties	Unit	Test Method	GUR® 4018 *GUR® 4018	GUR® 4016 *GUR® 4116	GUR® 4014 *GUR® 4114	GUR® 4012 *GUR® 4112	GUR® 4010 GUR® 4110
Average molecular weight	g/mol	Margolies' equation	0.6×10^6	0.7×10^6	1.0×10^6	1.7×10^6	2.0×10^6
Intrinsic viscosity (IV)	ml/g	Calculated from VN	500	600	700	1000	1150
MFR, 190/21.6	g/10min	ISO 1133	1.1	0.6	<0.1	<0.1	<0.1
Average particle size (D50)	µm	Laser scattering	115	115	115	115	115
Bulk density	g/cm³	ISO 60	0.45	0.45	0.45	0.45	0.45
Density	g/cm³	ISO 1183 method A	0.95	0.94	0.94	0.94	0.94

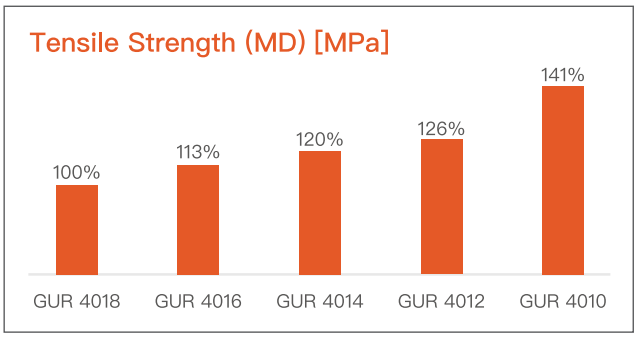
*These grades have been modified for optimal processability.

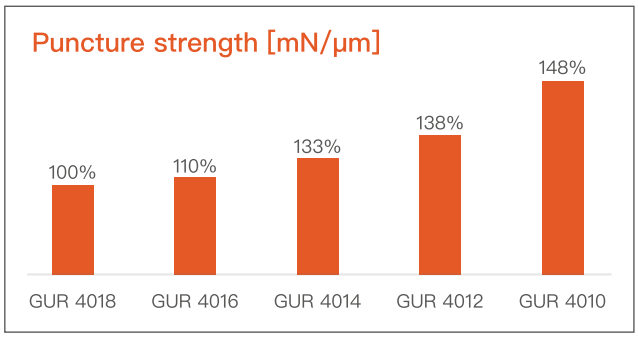


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Mechanical Performance





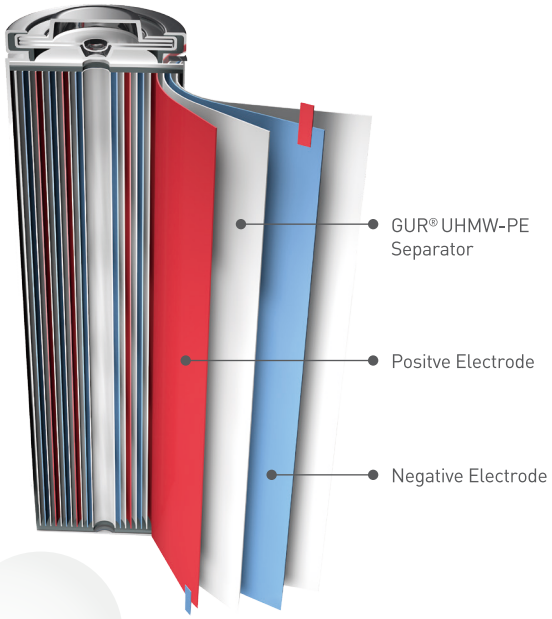
Microporous membranes are vital elements to both function and safety in the energy storage market in particular lithium ion batteries. Lithium ion batteries are the primary technology used for batteries in consumer electronics, stationary storage and electric mobility with rapid growth.

APPLICATIONS

- Electric vehicles
- Rechargeable hand-held devices
- Electronics

KEY FEATURES

- Constant quality
- Strict foreign body and metal ion control
- Very good processability in gel-extrusion process
- Excellent mechanical strength
- Provides high battery safety level



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Brochure Publication Number: GUR-026-MicroporousMembranse-SS-EN-0421

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