



Structural Performance Additives for Lithium-ion Battery Separators

Breaking the 10 μm Thickness Barrier with
Exceptional Thermal Safety Properties

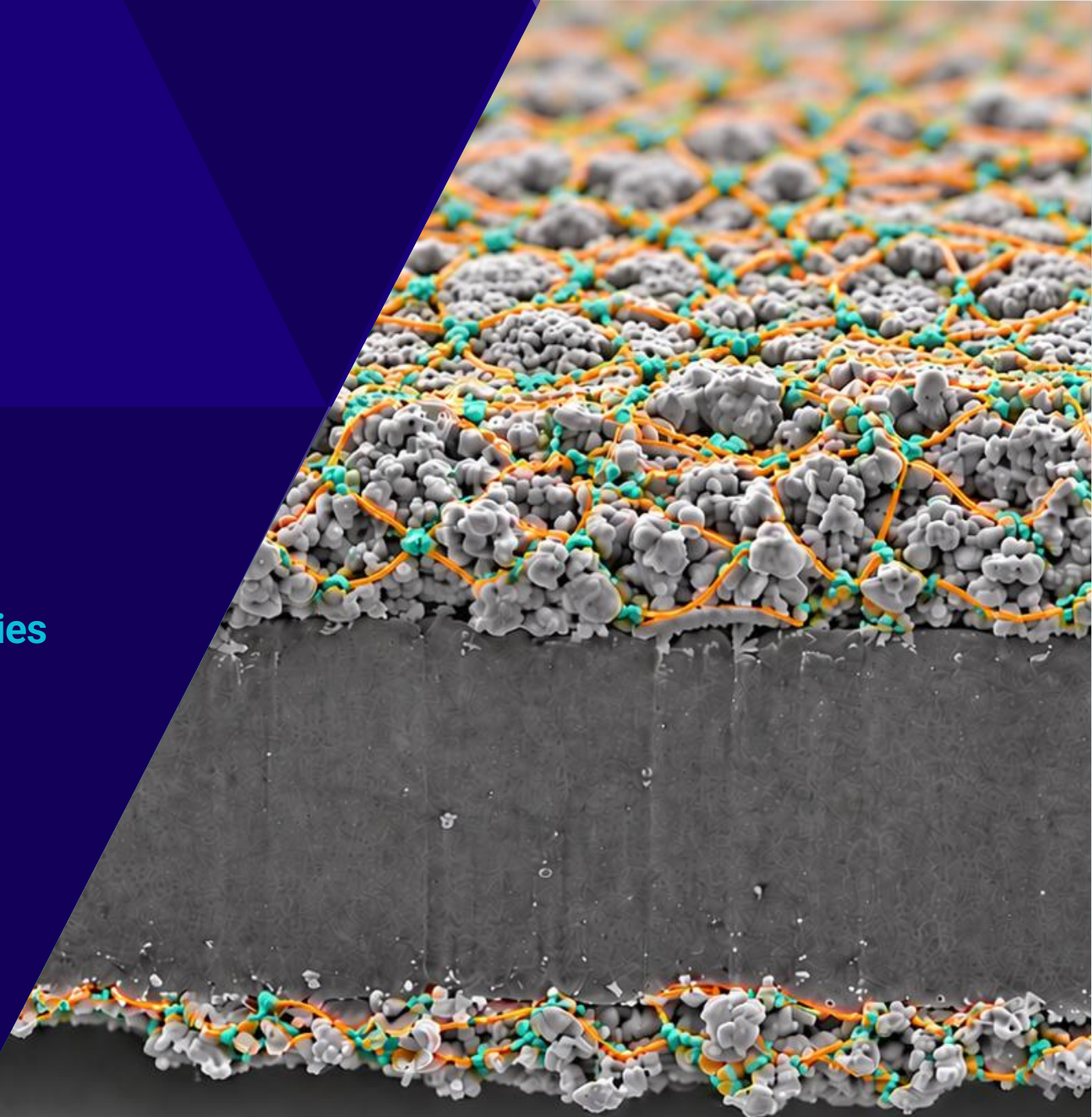
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THE **BAT**TERY SHOW

by informa...

14 October 2026, Detroit





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AnteoTech's Products and Technology

Established and growing business



- **Australian publicly listed company (ASX:ADO)**
- Advanced chemical and materials solutions business
- Advanced Battery Technologies and Life Sciences markets
- Headquartered in Brisbane, Australia

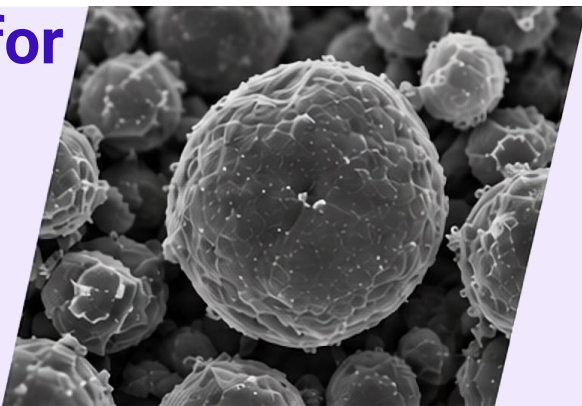
Proprietary patented technology



Portfolio of lithium-ion battery (LIB) products

- **Anteo C** – Cross-linker for water-based primer coatings
- **Anteo X** – Cross-linker for high silicon anodes
- **Anteo S** – Cross-linker for ceramic coated separators
- **SiMRAX** – Anteo X + SWCNT combined product for silicon anodes
- **Ultranode** – Ultra-high silicon content anode technology (70% – 95% silicon)

Innovating for the next generation of batteries



Deep expertise in battery chemistry and electrode development

- >20 wt% silicon active material anode focus
- Performance optimization of silicon anode designs
- Collaborations with novel cathode active material suppliers
- **Anteo X** and Anteo S production facility with commercial-scale supply capacity
- **SiMRAX** supply capability at GWh scale through US technology partner (BDS)



Cross-linking Performance Additives for Lithium-ion Batteries

Advanced materials. Better batteries. A cleaner tomorrow.

Images source: Company Generated



Cross-linker for primer coatings on current collector foils



Stabilises water-based binders to prevent primer dissolution during electrode coating



Improved Performance

- Improved adhesion between coating layers
- Reduction in electrical contact resistance.

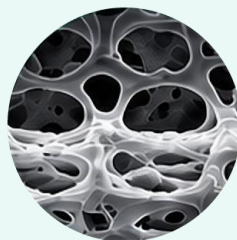


Improved Cost Efficiency

- Lower cost, eco-friendly binders.
- Allows for single component binder system.



Cross-linker for ceramic coated separators (CCS)



Reinforcing ceramic coatings on LiB separators



Safer and Thinner Separators

- Improved thermal stability, tensile and puncture strength.
- Reduces risk of thermal runaway and fires.



Ease of Use

- Fits into conventional manufacturing processes as a simple additive.



Cross-linker for silicon anodes



Stronger electrode structure for high-silicon anodes



Improved Performance

- Improved cycle life / capacity retention.
- Reduced anode expansion.
- Improved mechanical integrity.

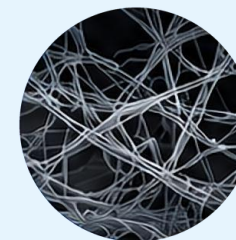


Improved Cost Efficiency

- Reduction in CNT and binder content.
- Compatible with a wide range of binders.



Anteo X® + SWCNT combination product



All-in-one binder strengthening system for high silicon anodes



High-Performance Solution

- Improves performance and reduces costs.
- Simplified slurry processing enabling easier scale-up.



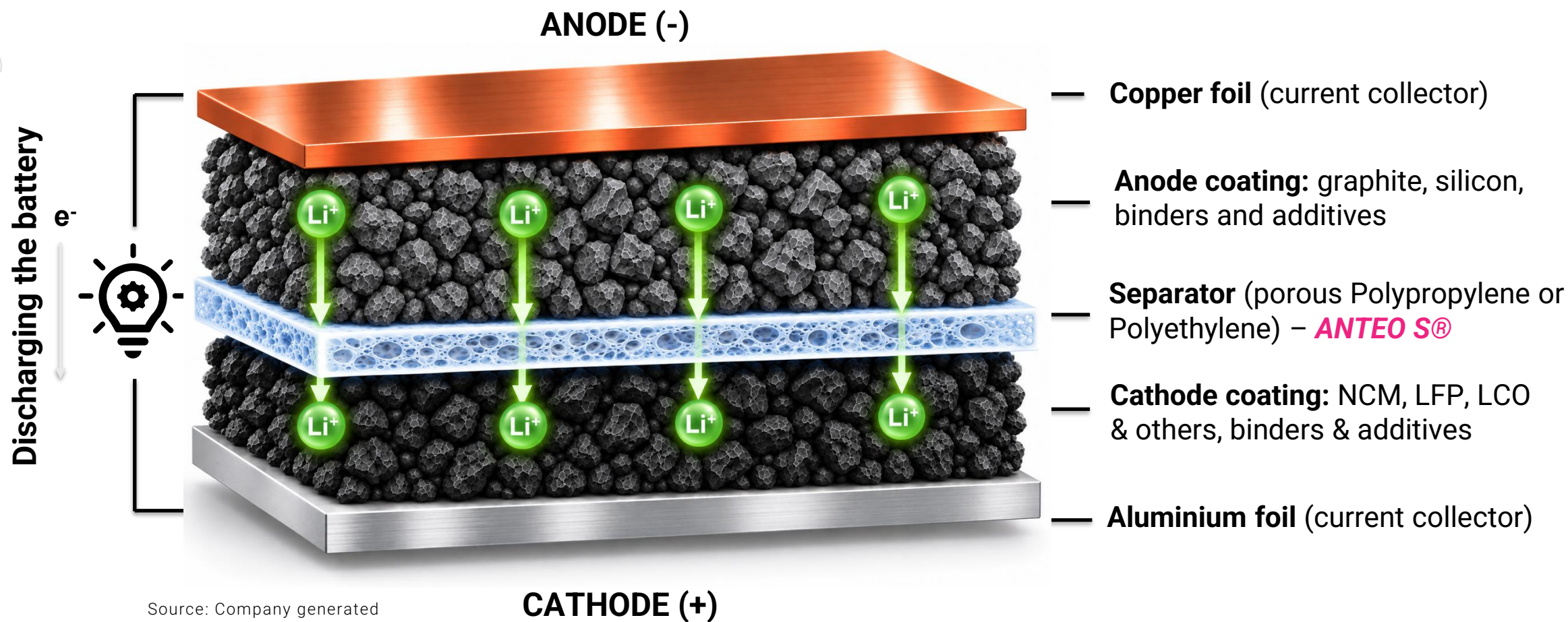
Advanced Technology

- Synergistic combination of additive products.
- Manufactured by **Black Diamond Structures** in the US.



Anatomy of a lithium-ion battery

Separators. The neglected component.





What is the function of a separator in a battery?

The separator is a critical safety component in a lithium-ion battery

- Conventional separators are micro-porous Polyethylene (PE) or Polypropylene (PP) films
- The porosity is critical to facilitate ion transport across the separator

Separator type	PE (°C)	PP in (°C)
Glass transition point (T_g) in °C	-130 to -120	-10 to 0
Melting point (m_p) in °C	130 to 145	160 to 170

- **Its key purpose in a battery?**
- Separating the anode from the cathode, preventing short-circuiting and thermal runaway
- Or else...



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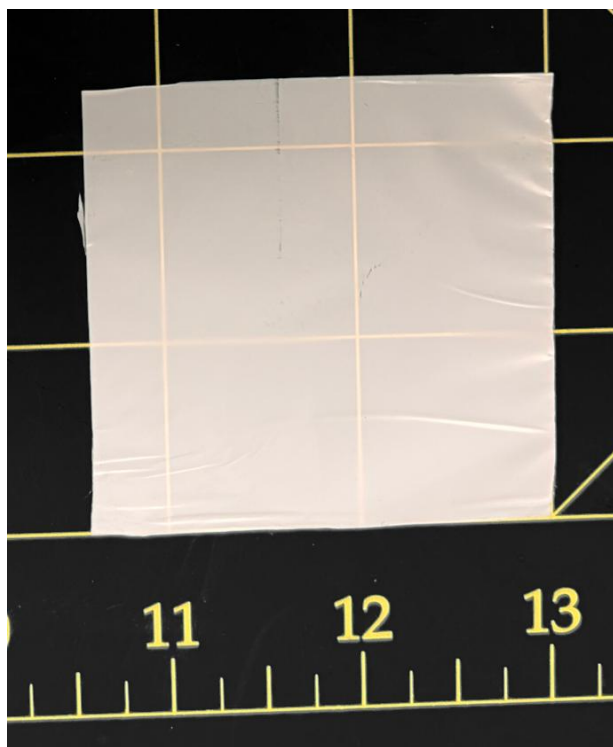


PE separators and heat

An unfavourable combination...

- What happens if a PE film is exposed to heat?
- PE films experience severe dimensional change at temperatures well below PE's melting point
- **The result:** The anode and cathode contact resulting in a short-circuit and thermal runaway

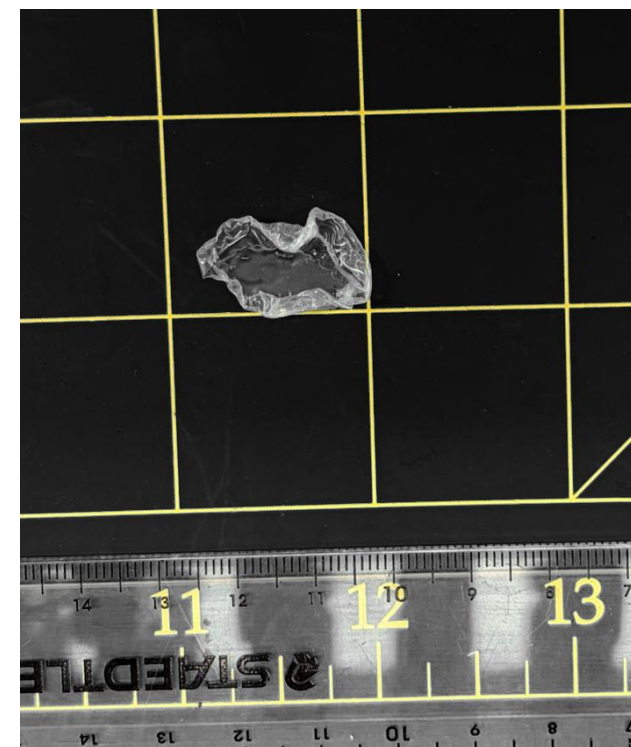
PE at room temperature



150 °C
in oven



PE after experiencing 150 °C





Ceramic Coated Separators (CCS) – Part of the solution?

Ceramic coatings help but they are not perfect

Conventional PE/PP separator base film



Source: Company Generated

Ceramic coated PE/PP separator base film



Source: Company generated

- Ceramic coatings on PE/PP base films help to mitigate some of the shrinkage
- Thicker coatings achieve reduced shrinkage, but thicker coatings add inactive weight and volume
- Battery and device OEMs are demanding thinner coatings to improve cost and energy density
- **Thermal separator stability while minimising ceramic coating thickness has reached its limit**

The Solution - Anteo S cross-linker technology for CCS

The missing piece of the puzzle

Performance

- Improved thermal stability and mechanical strength leading to reduced thermal shrinkage.
- Reduces risk of thermal runaway and fires

Cost reductions

- Minimizes binder and conductive material content
- Allows lower coating thicknesses
- Enables more sustainable, cost-efficient manufacturing

Product specifications

- Water-based, PFAS free solution
- Water-like rheology allows simple mixing
- Customisable across cross-linking strength and pot-life

Ease of use

- Fits into conventional manufacturing processes
- Broad binder compatibility
- Heat activated at conventional drying temperatures

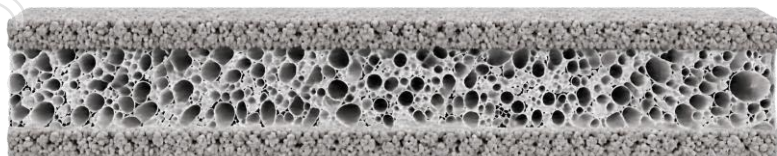


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The Solution - CCS with Anteo S

Thinner and more thermally stable coatings

Ceramic coated PE/PP separator base film



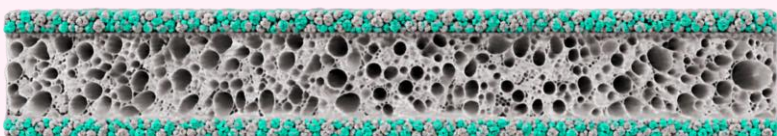
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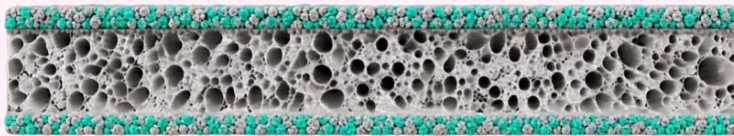
y% shrinkage

PE based separator coated with ceramic coatings **reduce separator shrinkage during thermal event**

Ceramic Coated Separator + Anteo S



Source: Company Generated



z% shrinkage

Anteo S reinforces ceramic coatings achieving

The outcome:

- Substantially increased thermal stability of separator at elevated temperatures
- Reduced coating thickness with excellent performance outcomes demonstrated with 1µm coatings
- Improved mechanical properties (tensile and puncture strength)



Why does CCS separator thickness matter?

Thinner separators = Higher energy density

STARTING ASSUMPTIONS

- Generic 5 Ah and 750 Wh/L pouch cell
- Cell stack repeat unit: Cathode + Anode + Separator on both sides of one electrode
- Separator thickness: 10 μm separator

Chemical Cell Stack – Layers	Thickness @ 10 μm	Thickness @ 9 μm	Thickness @ 7 μm
Cathode (Al + Active layer)	132 μm	132 μm	132 μm
Anode (Cu + Active layer)	138 μm	138 μm	138 μm
2 x Separator layers per stack	20 μm	18 μm	14 μm
Total repeat unit	290 μm	288 μm	284 μm
Volume saved per stack	-	2 μm	6 μm
Volume saved at total stack height	-	54 μm	162 μm
Energy density gained	-	+ ~5 Wh/L	+ ~13 Wh/L

The outcome:

- **0.5% to 2.0%** in energy density gain without changing the chemistry of the electrodes!
- **>2.0%** energy density gains possible for higher energy density cells

PE base film and improvements in thermal stability

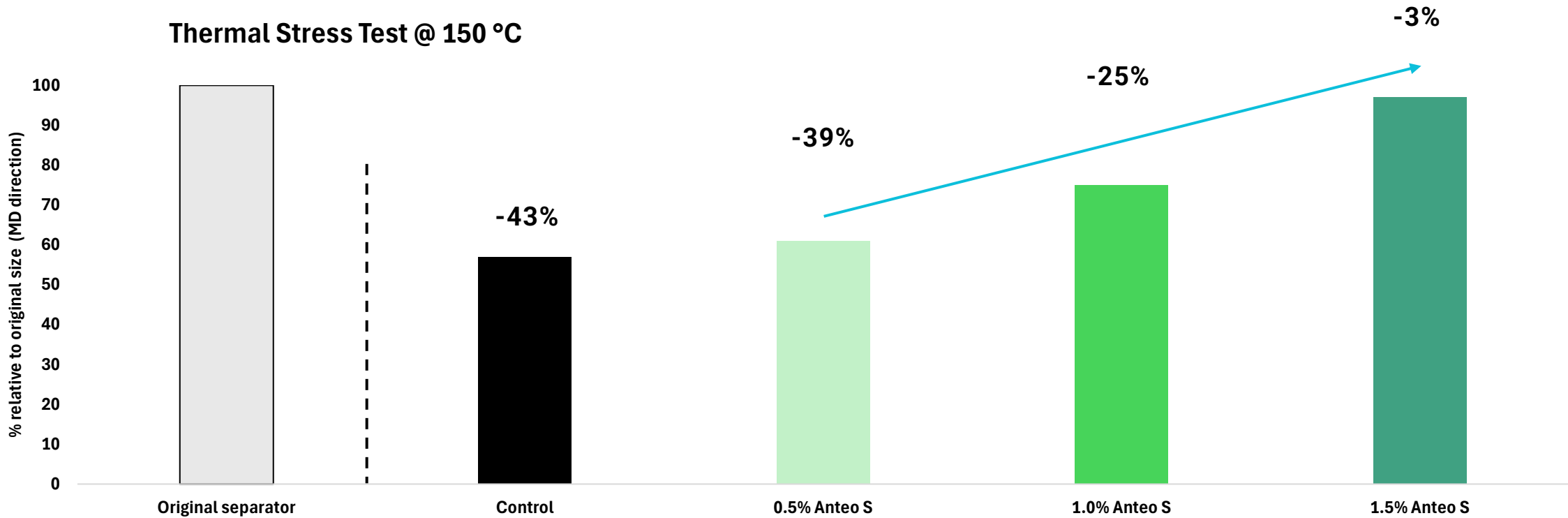
Case study 1 – External testing

Background information

Outcomes with Anteo S

- **Separator type:** Polyethylene (PE)
- **Total separator thickness:** 10 μm

- ✓ Substantial reduction in separator shrinkage
- ✓ Pilot-scale manufacturing trials in progress





PE base film and improvements in mechanical properties

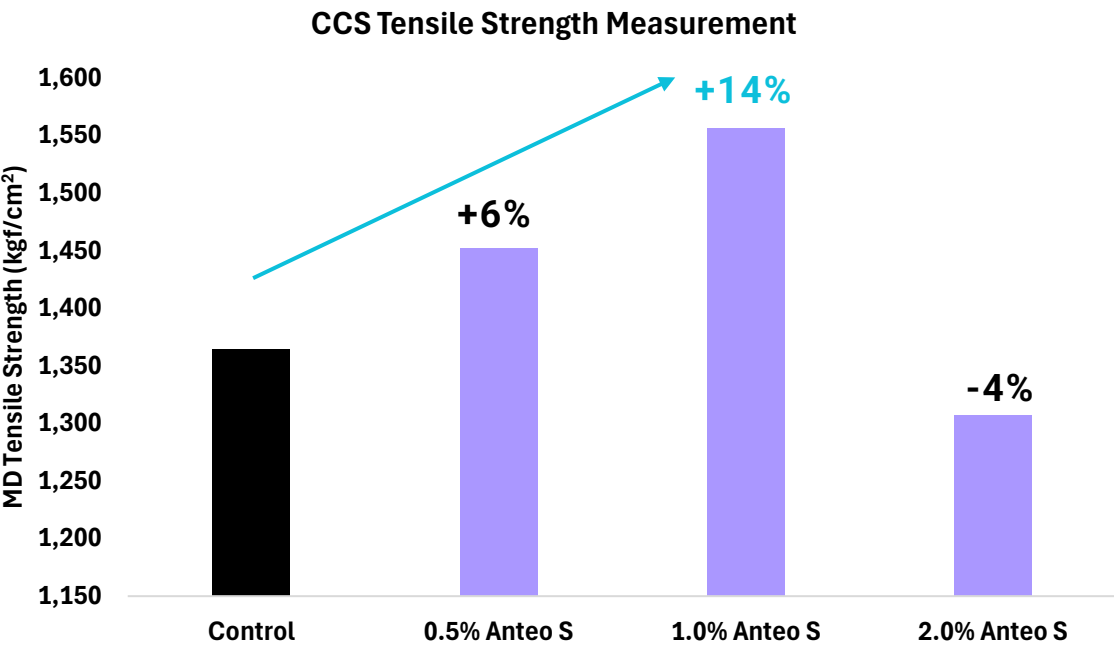
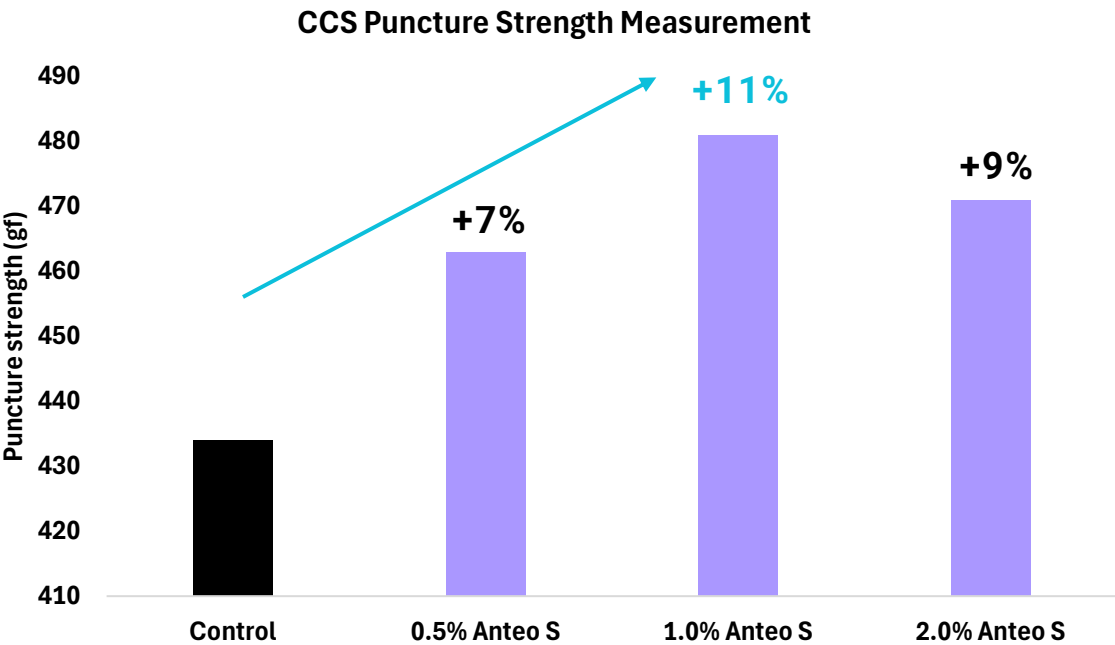
Case study 2 – External testing

Background information

Outcomes with Anteo S

- **Separator type:** Polyethylene (PE)
- **Ceramic coating thickness average:** 2.0 µm (1.0 + 1.0)
- **Base film thickness:** 7 µm

- ✓ Good improvement in tensile strength
- ✓ Good improvement in puncture strength



Teaming up with XERABRID for below 10 μm and safer separators

NEXT GENERATION SEPARATORS

Enabling safer Lithium-Ion Batteries



Maximises thermal stability



Minimises separator thickness



Enhances safety

Xerabrid[®]

Leader in ceramic coated separator (CCS) formulations and manufacturing



AnteoTech

ANTEO S[®] - Structural performance additive for CCS



Teaming up to deliver the next generation of separators

Separators with exceptional thermal stability and mechanical properties

Xerabrid®

Leader in ceramic coated separator (CCS) formulations and manufacturing



Based in **Seoul, South Korea**



Extensive CCS formulation and coating **IP/Know-How**



Pilot-scale CCS **manufacturing facility**



Contact for sampling in **South Korea and Japan**



AnteoTech

Leading structural performance additives for **CCS**



Based in **Brisbane, Australia**



Structural performance **additive portfolio**



ANTEO S® product pushes the boundaries of current ceramic coating limitations



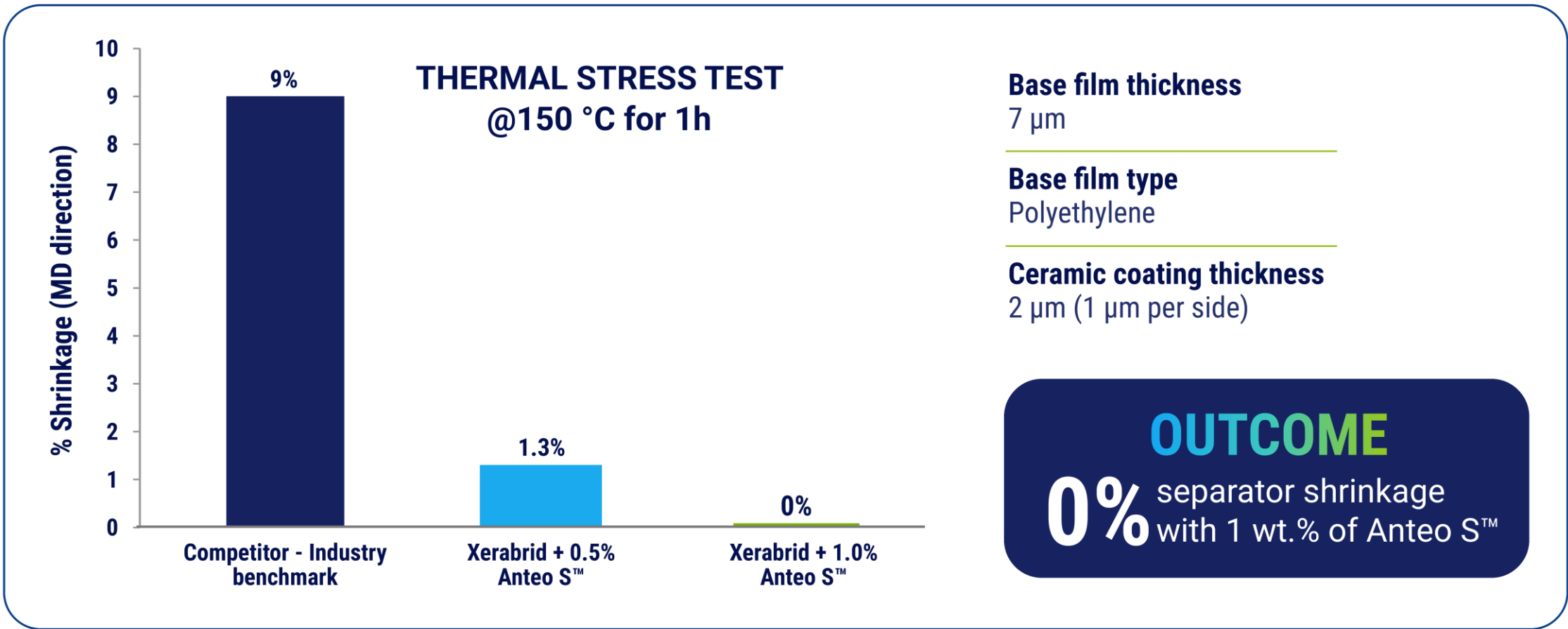
Contact for sampling in **EU, US and India**



Xerabrid test results for prototype product

Minimal coating thickness, high thermal stability

- Ceramic coated separator prototypes with 1 μm coating thickness per side currently in progress
- Initial testing on 7 μm PE base film confirms excellent thermal stability and mechanical strength



Products currently available for sampling and order

High thermal stability at minimal coating thickness

- High-performance ceramic coated PE and PP products available with exceptional thermal stability
- New developments target **7 µm total separator** thickness

Property		Unit	Xeracoat (PE)	Xeracoat (PE)	Xeracoat (PP)
Thickness		µm	9 (5+2+2)	11 (7+2+2)	11 (7+2+2)
Air Permeability (Gurley)		sec/100cc	< 180	< 200	< 60
Tensile Strength	MD	kg _f /cm ²	> 2,300	> 1,800	> 1,000
	TD	kg _f /cm ²	> 1,700	> 1,800	> 250
Elongation	MD	%	> 60	> 80	> 60
	TD	%	> 40	> 80	> 60
Puncture Strength		g _f	> 350	> 450	> 150
Thermal Shrinkage @ 150°C, 1hr	MD	%	< 1.5	< 1.0	< 0.5
	TD	%	< 1.5	< 1.0	< 0.5
Thermal Shrinkage @ 180°C, 1hr	MD	%	-	-	< 1.0
	TD	%	-	-	< 1.0
Basis Weight		g/m ²	10.0	13.0	10.0

MD = Machine direction
TD = Transverse direction



Want to learn more about thinner and safer separators?

Visit us at our booths

Xerabrid

BOOTH No. 4505
(TCMS Co., Ltd.)

AnteoTech

BOOTH No. 2204
(Team Australia)



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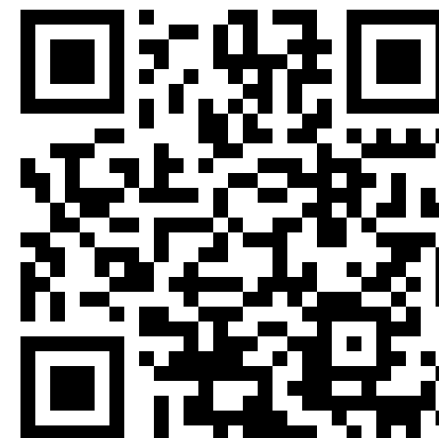
THANK YOU !



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*CONTACT US FOR
SAMPLES
AND PRODUCT SALES*



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