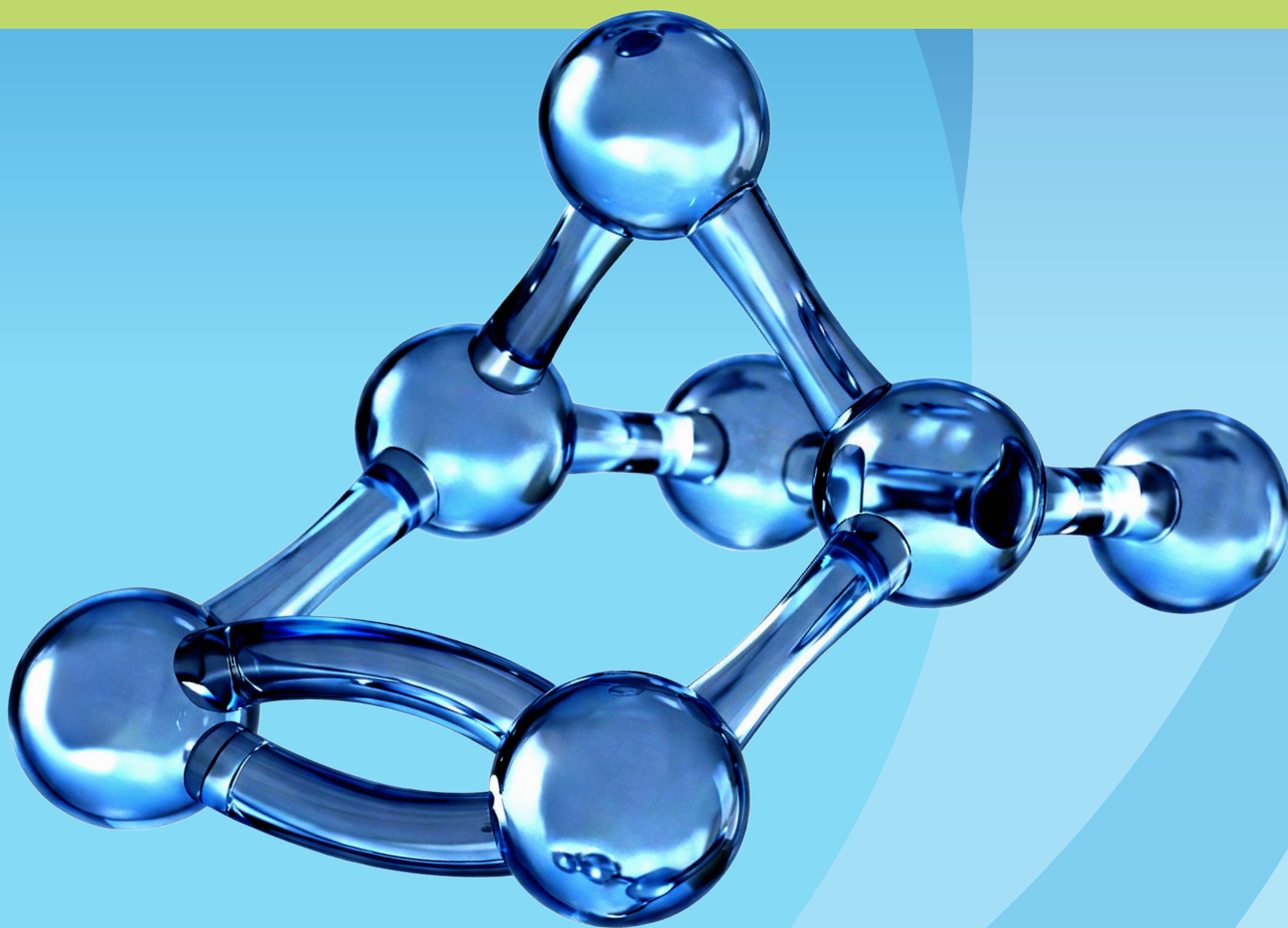




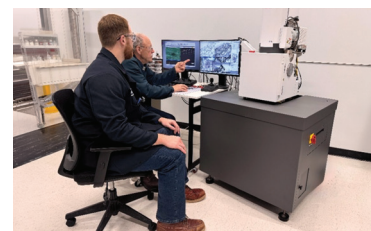
# PROMERUS®

Subsidiary of Sumitomo Bakelite Co., Ltd.

High Performance Materials Tailored to Your Application



Promerus is a global leader in cyclic olefin polymers (COP) and is driven to provide advanced material solutions for your application.



# PROMERUS®

Subsidiary of Sumitomo Bakelite Co., Ltd.

## Expertise You Can Trust

Located in Akron, Ohio, our team of scientists and engineers brings strong technical expertise to every collaboration.

## Tailored Material Solutions

We develop and produce norbornene monomers, polymers, formulations, and catalysts supporting projects from concept through production.

## Advanced Material Testing

Our comprehensive in-house testing—including NMR, GC/MS, SEM, and Instron®—ensures precise, data-driven characterization.

*Promerus leads advanced R&D, backed by SB's global production network.*

*SB provides international resources, scale, and expertise for your products to succeed.*



SB Headquarters

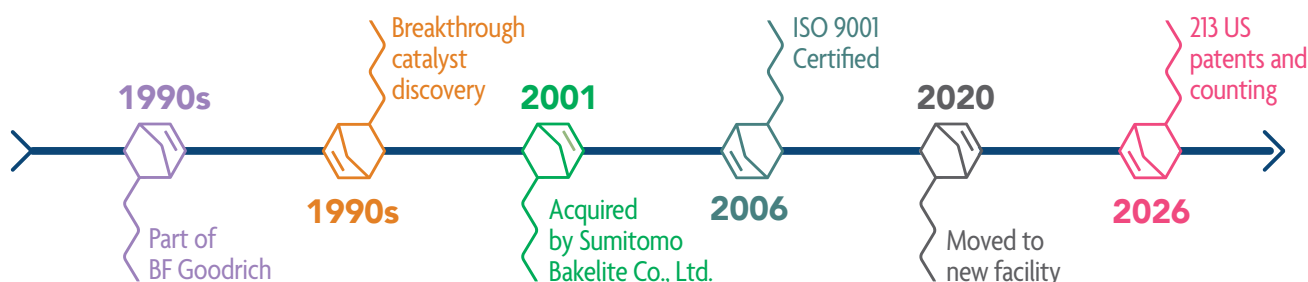


Utsunomiya Plant

## SUMITOMO BAKELITE CO., LTD.

- 8000 employees worldwide supporting all business aspects
- International locations:
  - Asia: Japan, China, Singapore, Malaysia, Indonesia
  - Americas: USA, Canada
  - EU: Belgium, Spain
- 2 Bn USD in sales (FY 2025)
- Large scale production & analytical capabilities to support any size project.

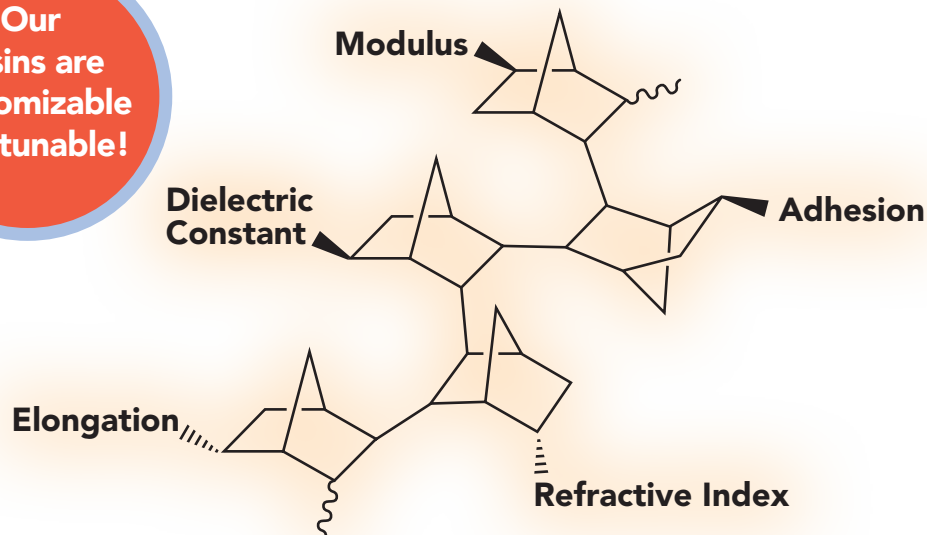
## Promerus Evolution Timeline



## Promerus' Polynorbornene is a COP

Our resins are customizable and tunable!

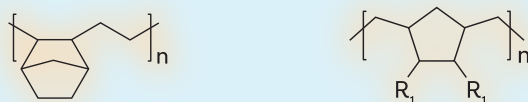
### Promerus COP



### Available functionalities:

- Acetate
- Acid
- Alcohol
- Alkyl
- Aryl
- Ester
- Epoxide
- Ether
- Fluorinated
- Olefinic
- Halogenated
- Silyl ether
- Others

### Other COP



| Comparative Polymer | D <sub>k</sub> (@1MHz) | T <sub>g</sub> (°C) | Cure Temp (°C) | Transparency (% 400-700 nm) | Modulus (GPa) | Elongation (%) | Refractive Index (at 589 nm) | Adhesion (tape test)                                                                | Water Contact Angle |
|---------------------|------------------------|---------------------|----------------|-----------------------------|---------------|----------------|------------------------------|-------------------------------------------------------------------------------------|---------------------|
| Promerus            | 2.2 - 4.0              | >0 - 330            | RT - 250       | >92%                        | 0.1 - 3       | 5 - 100+       | 1.36 - 1.64+                 | Si, Glass, SiO <sub>2</sub> , Si <sub>3</sub> N <sub>4</sub> , Cu, Au, Ti, Al, etc. | 40° - 110°          |
| Polyimide           | 2.8 - 3.5              | 200 - 400           | 200 - 350      | 60 - 88%                    | 1.0 - 3.0     | 10 - 80        | 1.5 - 1.7                    | (Same as above)                                                                     | 60° - 100°          |
| ZEONEX®             | ~2.2                   | 69 - 163            | N/A            | >92%                        | 1.8 - 2.4     | 10 - 120       | 1.51 - 1.53                  | Unlikely to adhere                                                                  | >100°               |
| TOPAS®              | ~2.2                   | 70 - 180            | N/A            | >92%                        | 2.6 - 3.2     | <10            | 1.53                         | Unlikely to adhere                                                                  | >100°               |

### Material



**Polymer in Solvent**



**Film**



**Formulation**



**100% Reactive System**

### Application



**Spin Coat**



**Slot Die**



**Ink Jet**



**Mold Cast**



Film



Polymer in  
Solvent



Spin Coat



Slot Die



Ink Jet

## Thermoplastic Polymers & Film

Our solvent processable thermoplastic COP polymers and films offer glasslike transparency, high thermal stability, and high  $T_g$ .



| Property                      | Value       | Unit    |
|-------------------------------|-------------|---------|
| Tensile Modulus               | 0.1 - 3     | GPa     |
| Elongation                    | 2 - 20      | %       |
| Transparency                  | > 92        | %       |
| Haze                          | < 0.5       | %       |
| Birefringence                 | 0           | nm      |
| Refractive Index              | 1.45 - 1.64 | -       |
| $T_d$ (5% Mass Loss)          | 100 - 300   | °C      |
| Decomposition Temperature 95% | Up to 350   | °C      |
| Water Absorption              | < 1         | %       |
| Solubility                    | Organics    | -       |
| Dielectric constant, $D_k$    | 2.3-2.7     | @10 GHz |
| Dielectric loss, $D_f$        | 0.0003-0.01 | @10 GHz |
| CTE                           | 30 - 200+   | ppm/°C  |



100% Reactive  
System



Formulated  
Solution



Spin Coat



Slot Die

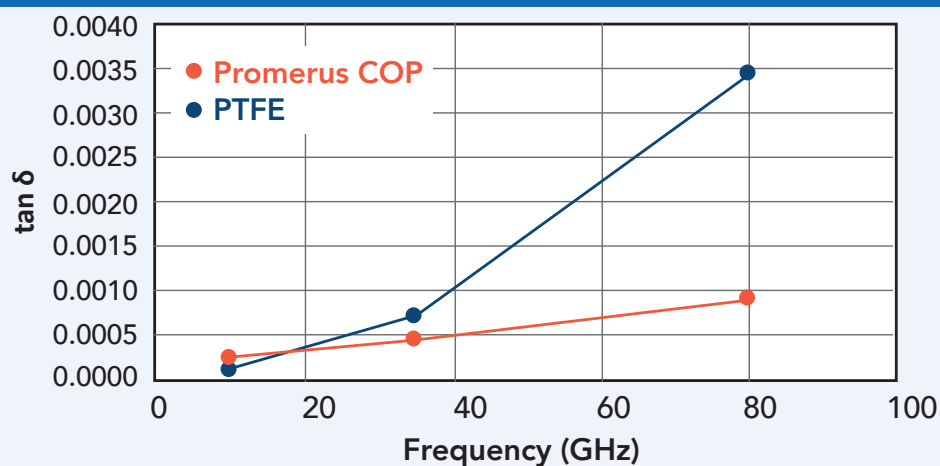


Ink Jet

## Low Loss Dielectric Polymers

Engineered for high frequency performance with low dielectric loss, high thermal stability, and minimal moisture absorption.

Transmission Loss vs Frequency



~100KHz

~100MHz

~1GHz

~5GHz

~25GHz

~60GHz

~75GHz

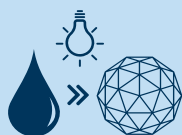
Epoxy Resin

LC Polymer

Promerus COP

$\tan \delta: 10^{-3}$

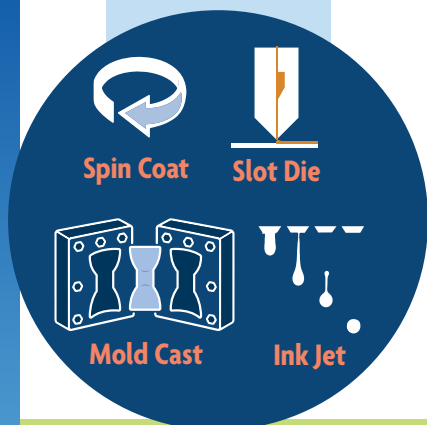
$\tan \delta: 10^{-4}$



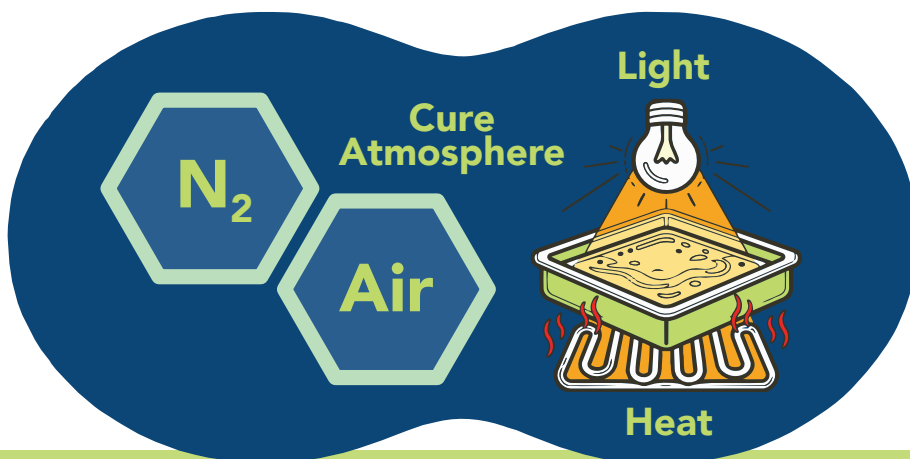
**100% Reactive System**

## Solventless & Tunable Reactive Formulations

Our tunable monomers afford fully reactive systems that can be tailored for any application.



Apply the resin



Air or inert atmosphere curing  
Curable by heat, light, or a combination

## Ink & Resin Properties (Pre Curing)

| Characteristics          | "V" Series Property Range | "R" Series Property Range |
|--------------------------|---------------------------|---------------------------|
| Metals                   | 10 – 100 ppm              | < 50 ppm                  |
| Minimum Cure Temperature | 10 °C +                   |                           |
| Cure Atmosphere          | N <sub>2</sub> or Air     | N <sub>2</sub> only       |
| Minimum UV Exposure      | > 100 mJ/cm <sup>2</sup>  | > 10 mJ/cm <sup>2</sup>   |
| Cure Time                | Seconds to minutes        | Seconds                   |
| Viscosity                | 5 – 100+ cP @ 25 °C       |                           |
| One-Pot Stability        | Months @ RT               | Years @ RT                |

## Polymer Properties (Post Curing)

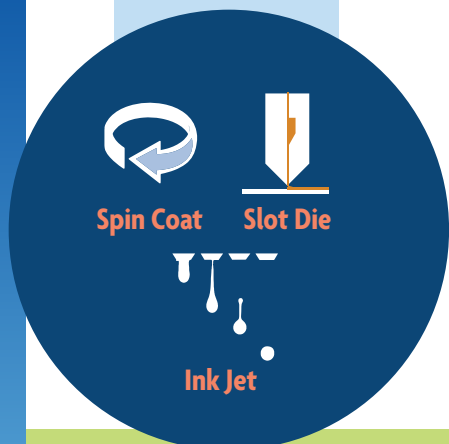
| Characteristics                                            | "V" Series Property Range                                                | "R" Series Property Range         |
|------------------------------------------------------------|--------------------------------------------------------------------------|-----------------------------------|
| T <sub>g</sub>                                             | 110 – 330 °C                                                             | – 20 – 200 °C                     |
| Thermal Stability in Air/N <sub>2</sub> (Td, 5% mass loss) | Up to 400 °C                                                             | Up to 430 °C (may oxidize in air) |
| Elongation to Break                                        | 5 – 100+ %                                                               |                                   |
| Tensile Modulus                                            | 0.5 – 2.2 GPa                                                            | 0.01 – 2.2 GPa                    |
| CTE                                                        | 50 – 200+ ppm/°C                                                         | 100 – 300+ ppm/°C                 |
| Conversion                                                 | Up to 99%+                                                               |                                   |
| Transparency (400–800 nm) @10 µm                           | > 98%                                                                    |                                   |
| Refractive Index @ 589 nm                                  | 1.45 – 1.64+                                                             |                                   |
| Dielectric Constant @ 1 MHz                                | 2.3 – 3.1                                                                | 2.4 – 3.1                         |
| Surface Adhesion                                           | SiO <sub>2</sub> , Si <sub>3</sub> N <sub>4</sub> , Cu, Au, Ti, Al, etc. |                                   |



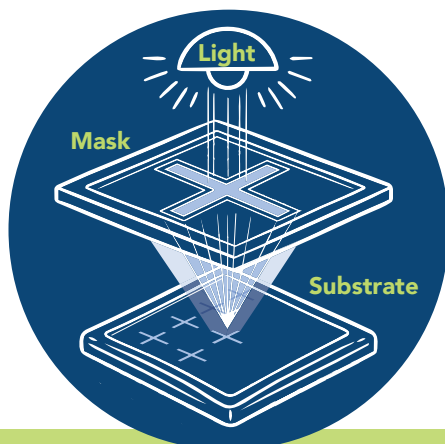
**Formulated  
Solution**

## Photopatternable Formulations

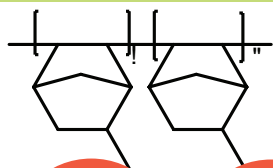
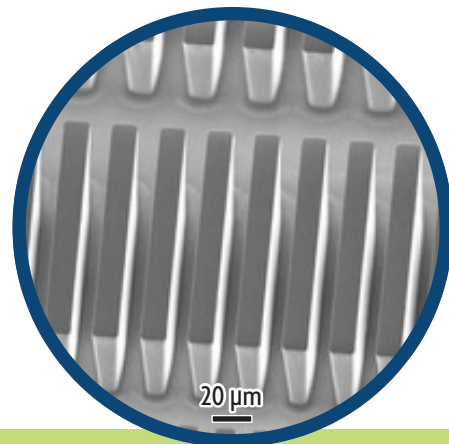
20+ years of experience developing lithography materials and formulations.



Apply the resin



Photolithography



Application  
functional  
group

Developer  
soluble  
group

### Features:

- PFAS-free
- REACH compliant (no NMP)
- Good etch resistance

### Options for i-line resists:

- Positive or negative tone
- Aqueous or solvent develop

### Applications:

- Low wafer stress layer
- Thick film > 20 μm layer
- Adhesive layer



**SUMITOMO BAKELITE CO., LTD.**

### Positive Tone

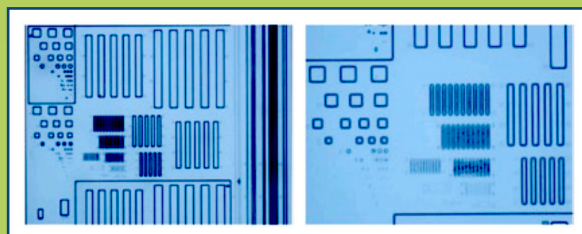
| Properties                      | COPLUS™ Resist         |
|---------------------------------|------------------------|
| Sensitivity                     | 580 mJ/cm <sup>2</sup> |
| Film Retention After Cure       | 88%                    |
| Transparency After Cure (400nm) | 92%                    |
| Dielectric Constant (100kHz)    | 2.9                    |
| Water Absorption at 25 °C       | 0.70%                  |
| Weight Loss at 250 °C/60 min    | 1.30%                  |

|                   | COPLUS™ Resist | Acrylate |
|-------------------|----------------|----------|
| After Development |                |          |
|                   | 68°            | 51°      |
| After Curing      |                |          |
|                   | 49°            | 27°      |

Substrate: Glass, FT: 2.5μm,  
PAB: 100°C, 120 sec,  
Exposure: GH line stepper  
Dev.: 2.38%TMAH, 90sec, 23°C  
Cure: 230°C, 30 min

### Negative Tone

| Properties                                      | COPLUS™ Resist |
|-------------------------------------------------|----------------|
| Film Retention After Cure                       | 84%            |
| Transparency After Cure (400nm)                 | 89%            |
| T <sub>d</sub> (5% Mass Loss) in N <sub>2</sub> | 309 °C         |



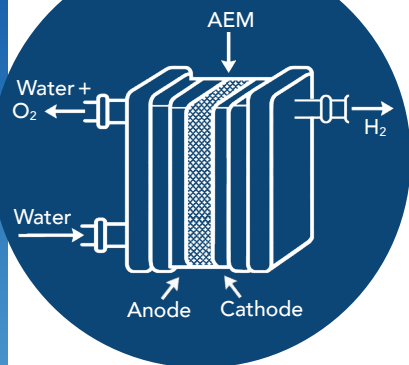
Substrate: Glass, FT: 3.0μm, PAB: 100°C, 120 sec, Exposure: Broadband Aligner  
Dev: 0.5%TMAH, 60sec, 23°C, Cure: 230°C, 60min



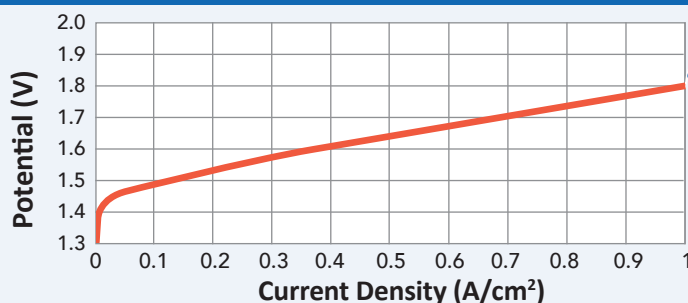
Film

## Anion Exchange Membranes

Promerus AEM combines high hydroxide conductivity with exceptional chemical and thermal stability for sustained performance in hot alkaline environments.



AEMWE Performance Using Promerus AEM and Ionomer



< 1.8 V @ 1 A/cm²  
(2026 DoE Target)

**AEM  
and ionomer  
can be  
supplied fully  
quaternized!**

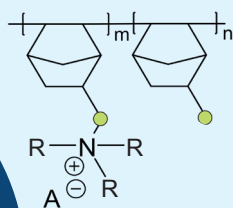
| Property              | Value           | Test Method                     |
|-----------------------|-----------------|---------------------------------|
| Ion Exchange Capacity | 2.0 - 2.6 meq/g | Titration                       |
| Conductivity          | >60 mS/cm       | In-plane<br>(-OH form at 25 °C) |
| Tensile Strength      | >30 MPa         | Instron®                        |
| Young's modulus       | >1.0 GPa        | Instron®                        |
| Elongation at Break   | >35%            | Instron®                        |
| Water uptake          | 30 – 50%        | at RT in H <sub>2</sub> O       |
| Tg                    | ≥ 170 °C        | DMA                             |



Polymer  
in Solvent

## Ionomers

Our ionomers offer tunable compositions, molecular weights, IECs, and anions to fit your needs.



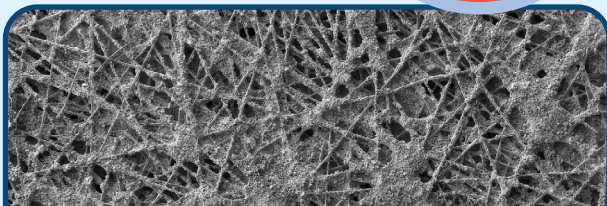
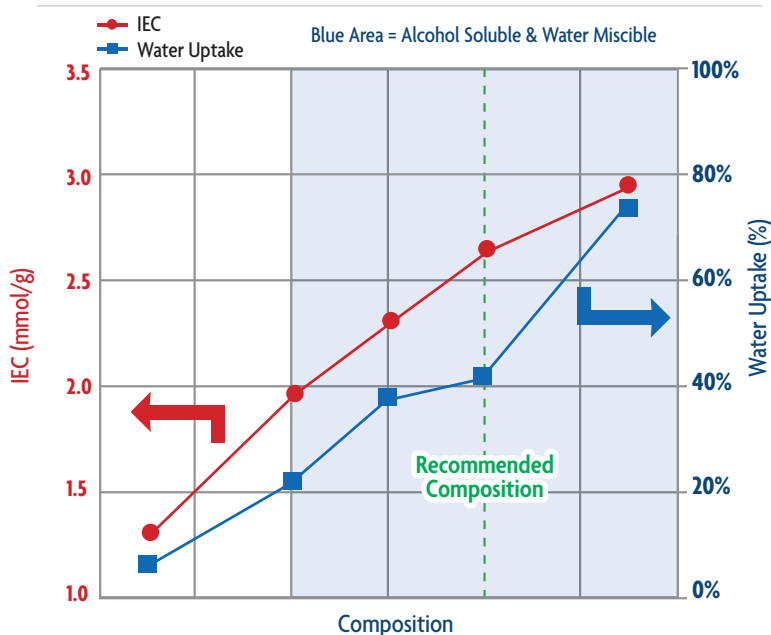
Spray Coat



Slot Die

**Tunable  
functionality  
& composition  
to meet  
performance  
goals!**

Composition vs Water Uptake and IEC



SEM of ionomer & catalyst spray coated onto a carbon gas diffusion layer.

20 µm



[www.promerus.com](http://www.promerus.com)

### Contact Us:



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