POLYCERA® MATERIAL PLATFORM

State-of-the-art polymeric filtration membranes offer a wide range of separation performance at a small footprint and commoditized prices; however, conventional materials have limited chemical and thermal stability and are prone to fouling. These materials require frequent cleaning which increases system downtime, chemical consumption, operating costs and membrane replacement. Alternatively, ceramic membranes offer similar separation performance with much greater stability and fouling resistance, but at a cost of up to 10X that of polymeric membranes.

Water Planet, Inc has developed a new generation of polymeric membrane materials, adapted from Nobel Prize-winning chemistry, into breakthrough membrane structures that exhibit unique performance properties unlike conventional polymeric and ceramic membranes. PolyCera membranes bridge the gap between the exceptional performance of ceramic membranes and the low cost of polymeric membranes.

WHAT MAKES POLYCERA® BETTER?

1. Hydrophilic

Hydrophilic means more water and lower OPEX. PolyCera membranes are constructed from a material that is intrinsically hydrophilic. This translates to:

- Maximum sustained flux
- Lower energy requirements
- Improved fouling resistance
- Easy to clean surface and pores

How hydrophilic is PolyCera?

Captive bubble contact angle measures the extent to which hydrophobic materials will displace water from the membrane surface and stick strongly to the membrane. The lower the angle, the more the material favors water, resists fouling and cleans easily.

<table>
<thead>
<tr>
<th>Hydrophilic PVDF</th>
<th>PolyCera Hydro</th>
<th>PolyCera Titan</th>
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<tr>
<td>59.5°</td>
<td>31.6°</td>
<td>13.3°</td>
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Lesst Hydrophilic | Most Hydrophilic

Above: Captive bubble (air bubble in deionized H₂O @ 25°C) with membrane lying horizontally with feed side facing down. Air is perfectly hydrophobic.

2. Robust

Robust means lower OPEX through easier cleaning and extended membrane life. The unique electronic properties of PolyCera behave a lot like metallic and ceramic materials, which are notable for their thermal and chemical robustness.

PolyCera Titan membranes are made from 100% PolyCera polymers by a patented process that gives rise to membranes that rival ceramics in their temperature and chemical stability, but at 10X lower cost and lower energy operations.

PolyCera Hydro membranes are made by a patented process of blending PolyCera and commodity polymers, which gives rise to membranes that exhibit robustness of the commodity polymer, but with unrivaled fouling tolerance and ease of cleaning.
POLYCERA® MEMBRANE PRODUCTS

### BENEFITS
- Lower operating cost
- Low energy demand
- Less process down-time
- Maintains high flux
- Low irreversible fouling
- Handles challenging waters
- Reduces chemical demand
- Minimizes waste

### APPLICATIONS
- Food & Beverage
- Biotechnology & Pharmaceutical
- Semiconductor
- Municipal Water & Wastewater
- Textile, Pulp & Paper
- Chemical & Petrochemical
- Mining, Oil & Gas
- Power

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PolyCera Titan Membranes were developed for oily water filtration.
PolyCera Hydro Membranes were developed for suspended solids removal.

**Case Study: PolyCera vs. Conventional Hydrophilic PVDF**
A field pilot demonstrates the superior performance of PolyCera Hydro relative to a leading competitor’s hydrophilic PVDF membrane treating secondary effluent in a Southern California municipal recycled water application. PolyCera exhibited 23% increase in daily throughput while providing a 20% decrease in specific energy consumption leading to a total operating expenditure savings of 38%.

MORE WATER. LESS COST.
“In our domestic wastewater, tertiary filtration application, PolyCera has lived up to its billing. Consistent TSS less than 1, all while functioning with relatively little cleaning requirement.”

- Alan Pyle, Chief Executive Officer, WaterFleet, LLC

“Water Planet’s qualifications in that area and the fact they can look independently at a lot of different commercial membrane technologies -- that is what attracted us to them for the membrane treatment side of things.”

- David Pernitsky, Senior Research Engineer Suncor Energy Inc., Calgary, Canada

“Water Planet’s knowledgeable and experienced engineering staff offers a depth of knowledge unmatched in the industry, and they offer such service in the most cost-effective manner we have seen to date.”

- Jung-Chul Kim, Executive Vice President, R&D Division, Hyundai Engineering & Construction (HDEC)

Contact Water Planet today to find out how PolyCera® membranes can revolutionize your membrane system