

of manufacture. It involves a spray-on, graphene-based coating applied to desalination membranes. The resultant product is durable and sturdy, capable of surviving even harsh operating environments. The membrane filter is able to function at high flow rates, is self-repairing, and has a long operational lifetime as it filters out salts and pollutants to generate clean drinking water without being subject to bio-fouling.

The hybrid membrane is created by simple spray-on applications that coat a mixture of graphene oxide and few-layered graphene onto the surface of a polysulfone membrane. The polysulfone has had its molecular structure modified by polyvinyl alcohol and serves as the structural substrate of the membrane. This structural support strengthens the membrane, allowing it to withstand high pressure and exposure to chlorine. It can easily remove up to 85% of salts (making the water suitable for agricultural applications) and up to 95% of chemicals such as industrial dyes.

#### MAJOR INDUSTRY SUPPLIERS

**Dow Water & Process Solutions** produces a family of reverse osmosis membrane filters capable of purifying different degrees of contaminated, brackish, and saline water. The company's Dow Filmtec Brackish Water RO Elements come in various sizes for different applications. The 8-inch-diameter model treats difficult industrial water, enabling lower energy usage and reduced costs. The models sized 4 inches and smaller are designed to handle light industrial brackish water and commercial brackish water respectively. Similarly, the Dow Filmtec Seawater RO Elements comes in differing sizes with the 8-inch-diameter model featuring high active membrane areas with low net driving pressure. Greater flow rates are achieved with the 4-inch diameter and smaller models.

**Evoqua Water Technologies** provides a wide range of water and wastewater treatment products and materials. These include cross-flow, micro-sand filtration systems, and pressure filter systems, as well as membrane filters for reverse osmosis and ultrafiltration.

**Pentair Water Filtration Division** produces 3-stage (GRO-350B), 4-stage (GRO-475B & GRO-475M), and 5-stage (GRO-575B & GRO-575M) reverse osmosis systems. The filtration units can remove lead, volatile organic compounds, chlorine, biological contaminants that cause bad taste and odor, cysts such as cryptosporidium, and discoloring turbidity.

**Scinor Water America** emphasizes the production of the membranes themselves. These are hollow-fiber

membranes made from Polyvinylidene Fluoride (PVDF) using the thermally induced phase separation (TIPS) method of manufacture. Using their own proprietary designs and configurations, they manufacture membrane modules which serve as direct retrofits. They require no additional hardware and are essentially plug-and-play units easily inserted into existing filter systems. <sup>WE</sup>

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