



## New Technologies Set To “Disrupt” The Industry

For the unfamiliar, the term “disruptive technology” initially sounds quite bad, as though it describes something that gets in the way. Far from impeding progress, disruptive technologies accelerate progress exponentially by disrupting the status quo. These technologies typically bubble under the surface, but when they finally erupt, they erupt hard. Old technologies are displaced, causing a major shift in the market. Think personal computers vs. mainframes or cell phones vs. land lines.

Which technologies have the potential to disrupt the water/wastewater industry? Three to watch are ceramic membranes, UV-LED, and capacitive deionization (CDI). Here's why.

**Ceramic Membranes** — According to BlueTech Research, a firm that tracks and analyzes innovations in the water industry, “Studies have shown that ceramics achieve better performance than polymeric membranes in terms of flux stability and treated water quality.” Furthermore, Tyler Algeo, director of research at BlueTech, states that, “Ceramic membranes have particular advantages in harsh industrial environments such as oil and gas. Ceramics can handle aggressive chemicals and temperatures that would degrade polymeric membranes.” Because they are robust, ceramic membranes can also be cleaned with aggressive chemicals, potentially reducing maintenance costs.

As the price has continued to come down, and with industrial wastewater and reuse an escalating concern, the stage is set for ceramic membranes to make their mark.

**UV-LED** — Algeo was equally excited by the prospects of UV-LED, which at the moment is in early-stage commercial development. Current UV systems for water/wastewater disinfection utilize bulbs — typically fluorescent tubes — that contain mercury and are susceptible to breakage. UV-LED satisfies the unique criterion of disruptive technology in that it generates UV in a new, less energy-intensive way. LEDs (light-emitting diodes) are not powered by a filament but rather by the movement of electrons in a semiconductor material. Smaller and more robust than UV bulbs, LEDs can be configured and used in a wider variety of applications.

As with ceramic membranes, the tipping point for UV-LED is cost of production. “It could be 5 or 15 years,” said Algeo, “but at a certain point it's expected that UV-LEDs will be cheaper to produce than traditional bulbs, which will be very disruptive for the market.”

**Capacitive Deionization** — CDI works by taking 99 percent of the water out of the one percent salt, rather than various conventional methods that do the opposite by removing the one percent of salt from water. The electrically-driven process draws dissolved ions (salt) out of the water with oppositely charged electrodes and membranes that selectively filter out cations and anions. Electrode polarization can then be reversed to regenerate electrodes and flush the system. According to Voltea, a CDI company tracked by BlueTech, the process typically recovers between 80 and 90 percent of the water it treats, compared to 50 to 70 percent for reverse osmosis. CDI also saves electricity by reusing the energy that is stored in the electrodes.

### Prepare For The Future

There are other water technologies that may ultimately have greater market impact than the three mentioned here — disruptive technologies can sometimes “come out of nowhere” — but these highlighted few appear particularly ready to bubble over. Additional worthy candidates appear later in this issue of *Water Online, The Magazine*, as we discuss real-time bacterial sensors on page 12 and sludge pretreatment systems on page 20. The value in monitoring the development of these new technologies is to be better informed and prepared for what the future holds. The savvy water professional will harness the power of innovation rather than be blindsided by it.

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