



























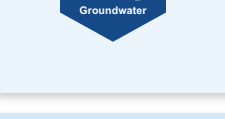

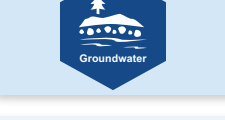

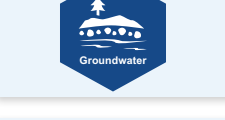



## CDM Smith PFAS Research and Development


CDM Smith staff are **principal investigators (PI)** or **co-PIs** on the following research projects. These projects are helping us to gain understanding of how per- and polyfluoroalkyl substances (PFAS) behave in the environment, and identify new technologies to treat contaminated sites—including those that break down PFAS.

Media	Subject	Timeframe	Summary
		2017 – 2020	<ul style="list-style-type: none"> <li>Studies PFAS fate and transport in groundwater at complex source-zone during biotic and abiotic transformation.</li> <li>Examines interactions between PFAS and co-contaminants during remediation, including <i>in situ</i> chemical oxidation, <i>in situ</i> chemical reduction, and biosparging.</li> </ul> <p><b>Co-PI, <a href="#">ER-2720</a></b></p>
		2018 – 2021	<ul style="list-style-type: none"> <li>Studies PFAS interactions with soil minerals and organic matter.</li> <li>Evaluates PFAS interaction when mixed with non-aqueous phase liquids trichloroethylene and JP4 jet propellant.</li> <li>Identifies the hydrogeological parameters under saturated and unsaturated conditions.</li> </ul> <p><b>Co-PI, <a href="#">ER18-1259</a></b></p>
		2018 – 2021	<ul style="list-style-type: none"> <li>Studies PFAS mass removal and mass discharge controlling process in the vadose zone and capillary fringe under variable saturation conditions.</li> </ul> <p><b>PI, <a href="#">ER18-1204</a></b></p>
		2019 – 2020	<ul style="list-style-type: none"> <li>Studies the potential use of nuclear magnetic resonance and complex resistivity as effective and rapid screening technologies for PFAS' assessment in soil, groundwater, and sediments.</li> </ul> <p><b>Co-PI, <a href="#">ER19-1128</a></b></p>
		Newly funded 2019	<ul style="list-style-type: none"> <li>Studies PFAS' improved analytical and environmental sampling techniques to assess and mitigate bias in PFAS levels during ground and surface water sampling.</li> </ul> <p><b>Co-PI, <a href="#">ER19-1205</a></b></p>
		Newly awarded 2019	<ul style="list-style-type: none"> <li>Assesses PFAS levels and release from finished, field aging biosolids (dissolved and colloidal) from multiple water resource recovery facilities.</li> </ul> <p><b>PI, <a href="#">WRF e.p16</a></b></p>
		2019 – 2020	<ul style="list-style-type: none"> <li>Studies the fate and transport of perfluoroalkyl precursors in soil and groundwater.</li> <li>Uses multiple analytical and fingerprinting tools.</li> </ul> <p><b>PI, Confidential Client</b></p>
		Completed 2015	<ul style="list-style-type: none"> <li>Studied boron-doped diamond (BDD) electrodes as an electrochemical oxidation technology to destroy PFAS.</li> <li>Laboratory results regarding the defluorination of PFAS look promising.</li> </ul> <p><b>PI, AFCEC</b></p>
		Completed 2015	<ul style="list-style-type: none"> <li>Electrochemical oxidation technology for perfluorooctanoic acid (PFOA) and Perfluorooctanesulfonic acid (PFOS) decomposition in groundwater.</li> <li>Used BDD and mixed metal oxide anodes to degrade perfluorinated compounds.</li> <li>Confirmed efficient defluorination for PFOS and PFOA, with 98% and 58% recovery as fluoride.</li> </ul> <p><b>PI, US Navy</b></p>
		Completed 2018	<ul style="list-style-type: none"> <li>Studied electrocatalytic and catalytic approaches for <i>in situ</i> PFAS treatment. Eelectrocatalytic: ruthenium oxide-coated titanium + mixed metal oxide anodes to oxidize PFAS.</li> <li>Catalytic: rhodium-based for the hydrodefluorination of PFAS.</li> </ul> <p><b>PI, <a href="#">ER-2424</a></b></p>

Media	Subject	Timeframe	Summary
		2017 – 2020	<ul style="list-style-type: none"> <li>Studies PFAS removal from investigation derived waste by sorbing into chitosan-modified montmorillonite nano-composite.</li> </ul> <p><b>Co-PI, <a href="#">ER18-1526</a></b></p>
		2017 – 2020	<ul style="list-style-type: none"> <li>A field demonstration of PFAS removal by nanofiltration, then PFAS' destruction by sequential ultraviolet oxidative/reductive in reject water.</li> </ul> <p><b>Co-PI, <a href="#">AFCEC BAA-031</a></b></p>
		2018 – 2021	<ul style="list-style-type: none"> <li>Develops a decision support tool for PFAS treatment and destructive technologies.</li> <li>Compares various treatment scenarios using multiple metrics through life-cycle assessment (LCA) and costing basis.</li> </ul> <p><b>Co-PI, <a href="#">ER18-5053</a></b></p>
		2017 – 2020	<ul style="list-style-type: none"> <li>Couples regenerable ion-exchange resin and destruction (electrochemical and photochemical treatment) technologies for PFAS removal and destruction.</li> <li>Studies the influence of co-contaminants on resin adsorption of PFAS.</li> <li>Uses life-cycle cost analysis and LCA modeling throughout to guide experimental design decisions.</li> </ul> <p><b>Co-PI, <a href="#">ER18-1063</a></b></p>
		2018 – 2021	<ul style="list-style-type: none"> <li>Couples electrochemical coagulation with electrochemical oxidation to concentrate, then destroy PFAS in waters.</li> </ul> <p><b>PI, <a href="#">ER18-1278</a></b></p>
		2017 – 2021	<ul style="list-style-type: none"> <li>Couples ion-exchange resin with electrochemical oxidation for complete separation and destruction of PFOS and PFOA in groundwater.</li> </ul> <p><b>PI, <a href="#">AFCEC BAA-108</a></b></p>
		2019 – 2021	<ul style="list-style-type: none"> <li>Develops physiologically based pharmacokinetic modeling tools to improve risk assessment and risk management capabilities for agricultural practice and food production.</li> <li>Collaborative effort with US and Australian regulators.</li> </ul> <p><b>PI, funded by EPA Victoria, The Australian Government &amp; CDM Smith</b></p>

## Key CDM Smith PFAS Team Members

Dora Chiang leads CDM Smith's PFAS practice, building platforms that connect our water and environment practitioners to develop better treatment solutions.



**Sheau-Yun (Dora) Chiang**  
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Kent Sorenson leads CDM Smith's environment strategy, with a major focus on identifying and optimizing PFAS treatment solutions for our clients.



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Charles Schaefer is the PI of multiple PFAS research and development projects, and directs CDM Smith's Bellevue Research and Testing Laboratory. He and his team are breaking new ground on exciting PFAS remediation technologies.



**Charles E. Schaefer**  
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Zoom Nguyen manages the Bellevue Research and Testing Laboratory's operations. He is a key team member conducting PFAS research and development for soil and groundwater remediation.



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