Grant Information: Institution, Principal Investigator(s), Contact Information, Grant Number	**University of California, Riverside** **Project:** Synergistic Material-Microbe Interface Toward Faster, Deeper, and Air-Tolerant Reductive Dehalogenation **Project Leaders**: Yujie Men, Chong Liu (University of California-Los Angeles) **Funding Period:** 2021-2025
Technology	Solar-powered material-microbe interface to accelerate the activity of bacteria used to clean up contaminants.
Innovation	**Materials:** Nanomaterials that are biocompatible and/or can provide low redox potential for reductive dehalogenation. **Biological:** Microcosms capable of degrading target contaminants and performing synergies in enhancing the degradation at the electricity-driven material-microbe interface. **Why is this technology/approach different than what is already in the market?** It incorporates new advances in nanomaterials science to optimize bioremediation leveraging solar power.
Contaminant and Media	**Contaminants:** Halogenated contaminants, 1,4-dioxane **Media:** Groundwater
Expansion Potential	**Looking Forward: What other contaminants/media would work for your technology?** Other contaminants in water environments that may undergo reduction reactions and have a high demand for reducing power (e.g., H_2). **Combined Remedy: Would this technology work well with other treatment approaches?** It may be combined with electrochemical and biological oxidation processes.
Sites/Samples	We have not reached the stage of testing field samples. The PI has been in contact with several impacted field sites in California. Groundwater samples will be taken and used in the bioelectrochemical system to test the matrix effect.

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Technology Readiness Level	TRL 3 — Experimental proof of concept
Update of Progress	We are now using dual sets of 8-channel bioelectrochemical systems to investigate synergies at the material-microbe hybrid for deeper defluorination of more environmentally relevant PFAS structures by various defluorinating cultures (including a new defluorinating enrichment culture and one isolate from the enrichment). The bioelectrochemical system is also being optimized by providing organic growth substrates for the defluorinating microorganisms to sustain the defluorination activity for a longer time. Besides optimizing the bioelectrochemical system as a whole, we also made efforts to optimize conditions for the electrochemical and microbial parts individually. Microbially, we further examined biodefluorination pathways for another group of PFAS, ether PFAS, and isolated defluorinating microorganisms to be used in the bioelectrochemical system. Electrochemically, we tested the reductive defluorination activities of a number of bio-inspired electrocatalysts against legacy PFAS, such as PFOA, under controlled voltages.