Grant Information: Institution, Principal Investigator(s), Contact Information, Grant Number	**University of Maryland, Baltimore County** **Project:** Leveraging the Chemo-Physical Interaction of Halorespiring Bacteria With Solid Surfaces to Enhance Halogenated Organic Compounds Bioremediation **Project Leaders**: **Upal Ghosh**, **Kevin R. Sowers**, **Amar Wadhawan** (ARCADIS) **Grant:** R01ES032719 **Funding Period:** 2021-2025 **Contact:** ughosh@umbc.edu
Technology	The research team is developing carbon-based sorbent materials to enhance the ability of bacteria to break down mixtures of chlorinated organic contaminants, such as chloroethenes and polychlorinated biphenyls in groundwater and sediments.
Innovation	**Materials:** A set of BC materials are being synthesized to create a range of tailored properties such as specific surface area, pore size distribution, electron accepting capacity, electrical conductivity, and sorption capacity. **Biological:** A PCE and PCB dechlorinating bacteria, *Dehalobium chlorocoercia*, is being used to evaluate the interaction with tailored material surfaces. **Why is this technology/approach different than what is already in the market?** The research is first developing the fundamental understanding of the material surface and bacterial interaction to optimize the development of tailored materials that would enhance the biological process.
Contaminant and Media	**Contaminants:** We are targeting PCE and TCE in groundwater and PCBs in the sediment matrix. **Media:** Soil and sediment mix, groundwater
Expansion Potential	**Looking Forward: What other contaminants/media would work for your technology?** The technology can be translated to other chlorinated compounds, like DDT. **Combined Remedy: Would this technology work well with other treatment approaches?** This technology will work well with other in-situ remediation technologies.
Sites/Samples	For this R01 project, we are not working at a field site. However, we are using sediments from an intertidal marsh site located in Edgewood, Maryland, for laboratory experiments.

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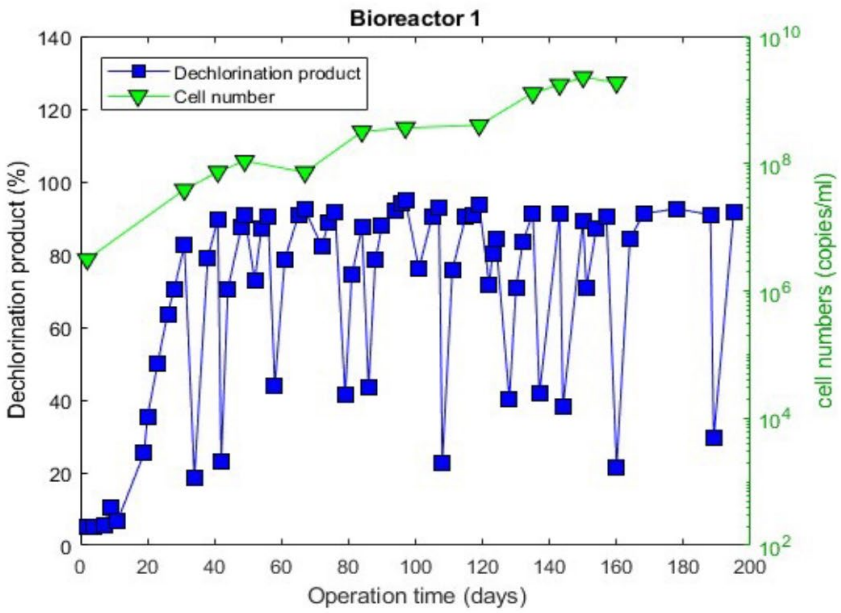
Technology Readiness Level	TRL 4 — Technology validated in laboratory
Update of Progress	In the last year, we have made progress on five fronts: 1) Successively maintaining two bioreactors with active DF-1 culture as a source for cell material for the kinetic studies; 2) Establishing methodologies for measuring biokinetics for surface-attached cells on fine-silica, graphite, and activated carbon surfaces; 3) Performing mass balance for chloroethenes and cell numbers using new methods developed in this project; 4) Optimizing growth medium for the optimal measurement of dechlorination kinetics; 5) Establishment of sediment microcosm experiments. We have completed the development of methodologies and optimization for the biokinetic measurement of microorganisms growing on solid surfaces incubated in the growth medium. Ongoing work is focused on using the developed method to acquire experimental biokinetic data and verify the impact of different material surfaces. Our current efforts on the sediment microcosm design will also focus on translating the biokinetic results from the liquid medium into the more complex sediment matrix.



Growth of Dehalobium chlorocoercia *in batch bioreactor through multiple cycles of PCE addition and purging of products.*