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FOR IMMEDIATE RELEASE

EnBiorganic Technologies' Malcolm Burbank Selected for Field Scale Demonstration in Agile Revetment Challenge

Las Vegas, NV April 2022 – Dr. Malcolm Burbank, lead technologist and engineer with EnBiorganic Technologies—a world leader and trailblazer in the research and deployment of microbiology-based technology solutions—is part of a team of engineering students and faculty from Boise State University (BSU) that has won a $100,000 challenge award for a field scale demonstration of their submission. The award was for Phase Two of the team's research in creating protective barriers using enhanced local soil, which can withstand small arms fire and shrapnel to protect aircraft and other Air Force assets.

Dr. Burbank serves as a principal investigator on the project with Dr. Bhaskar Chittoori, Chair for Civil Engineering at BSU. They lead students from the BSU Civil Engineering department, who researched the use of microbial induced calcite precipitation (MICP) to strengthen local soil from a given location to build a stronger, more effective revetments. Revetments are sloped barrier structures formed to secure a site from artillery, bombing, or stored explosives.

The Agile Revetment Challenge is an open award challenge seeking innovative ways to deploy rapid-build revetments that can withstand the elements, small arms fire, and shrapnel. Essential to the Air Force—which often needs the agility to deploy rapidly—the materials needed to conduct this solution needed to be extremely limited and lightweight, and construction had to minimize personnel and time required to build the structures.

The applications of such structures are obvious to saving lives and equipment on battlefields, but the promise of MICP technology knows no bounds.

"This is a very interesting application for the microbial induced calcite precipitation technique my research group has been investigating for the past few years," Dr. Chittoori says. "Building revetment structures using local soil facilitated by the indigenous bacteria is a low-cost, environment-friendly approach that we discovered in Phase One of our research. This (newly funded Phase Two) research has the ability for a wide range of applications beyond military use, especially for domestic applications including embankments and foundation repair," and revolutionizing rehabilitation work for various civil construction, including transportation infrastructure, residential dwellings, and water infrastructure.

Doctors Burbank and Chittoori were part of a select number of research teams that won an initial $20,000 to build benchtop demonstrations for rapid revetment solutions. Remarkably, they developed a way to use indigenous bacteria

present in local soil to facilitate calcite precipitation. This makes the soil strong enough to create a solid revetment structure that resists small arms fire up to 50 caliber rounds, fired from a close distance.

Dr. Burbank and team discovered the MICP process to create biocement using on-site soil from nearly any location, deployable almost anywhere, as it uses ubiquitous, naturally occurring microbes. The solution is also carbon-negative, sequestering about 730 kgs. of carbon per ton of biocement created in Dr. Burbank's MICP process. In contrast, the manufacturing of traditional cement releases about 1 ton of carbon per ton of concrete manufactured.

Microbial-induced calcite precipitation is a process catalyzed by indigenous or exogenous bacteria, in which urea (the most common type of fertilizer) is hydrolyzed by the microbial enzyme, urease. In this process, calcium carbonate is precipitated as the mineral, calcite, which enables cement-adjacent soil particles to fill the pore space in soil. This reduces permeability and increases indigenous soil strength.

This MICP process was originally developed at the University of Idaho, to reduce the potential for liquefaction during earthquakes.

"Bhaskar and I have worked closely over the past several years to explore other applications for MICP, and have enjoyed many successes," explains Dr. Burbank. "This award will allow us to move forward with testing MICP to make protective barriers for our military."

Their forthcoming field-testing research will include one of the largest-scale MICP demonstrations ever conducted, and the first of its kind.

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EnBiorganic Technologies, founded in 2019, bridges science and technology to contribute to a living planet. We believe in synergy—various parts working together to produce an enhanced result. We are driven to build innovative solutions based on a foundation of solid science. Our team is focused on solving big issues that will have a significant impact in our backyard and beyond. Our platform technology in wastewater, surface water, animal agriculture and now soil structure enhancement create value for our clients, while protecting the planet's most valuable resources. Learn more at https://enbiorganic.com.