

ADVANCING THE SCIENCE OF BIOFORMULATION



Expand your product portfolio with innovative bioproducts that have characteristics your clients demand: long shelf-life, easy handling and application, and improved field efficacy. Battelle combines decades of experience in agrichemical formulation with applied biologics expertise honed in the pharmaceutical and biodefense industries to find practical solutions to the unique challenges of agricultural bioformulation. Our integrated approach to research, development and regulatory compliance will help you move to market quickly while controlling costs and risks.

BIOFORMULATION

Develop and lab test new bioproducts and find answers to your bioformulation challenges. We work with all types of bio-based active ingredients (bacteria, fungi, viruses, proteins, metabolites) and apply innovative techniques to prepare stable, effective bioformulations.

- Feasibility studies
- Amendment selection and screening
- Formulation optimization
- Encapsulation techniques
- On-seed testing
- Desiccation tolerance testing
- Storage stability testing

PRODUCTION AND PROCESSING

Move your product from the lab to the field with confidence. Our bioproduction experts can work with you from bench-scale testing to pilot production so you can move smoothly to commercial manufacturing.

- Batch preparation
- Scale-up and process transfer

- Production optimization
- Drying optimization
- Seed treatment

REGULATORY SUPPORT

Get new formulations to market quickly and confidently with Battelle's regulatory compliance expertise. We can help you navigate regulatory requirements to gain access to new markets in the European Union, the United States and worldwide.

- Study design and support for global registration including EU and EPA
- Gap analysis
- Dossier preparation and submission
- Expert advice for dossier defense
- A full range of GLP studies, including physiochemical, toxicology, residue, environmental fate and more

Capabilities

- Bioformulation
- Production and Processing
- Regulatory Support



At Battelle, we don't just apply cutting-edge biologics techniques—we invent them. We are leveraging decades of experience in agriculture, pharmaceuticals and biodefense to solve some of today's toughest bioproduct challenges, from extending shelf-life of biologics to developing liquid and dry formulations that are compatible with existing equipment.

BIOLOGICS STABILIZER SCREENING PLATFORM

Selection of stabilizing amendments for bioformulation has largely been done by trial and error in the industry. Battelle has developed a rationally designed approach that is fast, structured and adaptable to identify bioformulations that are best suited to stabilize your product. Our biologics stabilizer screening platform tests and compares the efficacy of hundreds of different amendment combinations all at once for faster and more consistent amendment testing and selection. This high-throughput testing method allows us to meet industry's need to move biologics products to market faster.

PRODUCT ENCAPSULATION

Encapsulation offers a number of benefits for biologics: protection from the environment, a substrate for adhesion and the opportunity to incorporate a growth medium right where it's needed. Battelle is applying encapsulation techniques used in drug delivery and tissue engineering to the agricultural market. We encapsulated a common agricultural microbe in alginate beads to test the efficacy and stability of the encapsulation method. Results showed high efficacy, with approximately 75 percent of microbes remaining viable after encapsulation, and superior stability at room temperature compared to unencapsulated microbes.

SOLVENT-ASSISTED DRYING AND ENCAPSULATION

Standard spray, freeze and vacuum drying techniques can result in significant losses in microbe viability and undesirable properties such as clumping. We demonstrated a novel solvent-assisted drying process that has generated highly active dry bacterial microparticles. The resulting dried product formed highly dense, uniform spherical microparticles with high microbial viability. Solvent-assisted drying allowed us to avoid some of the stresses of traditional drying techniques (e.g. heating) and resulted in a highly uniform product that may be advantageous for microencapsulation.

Every day, the people of Battelle apply science and technology to solving what matters most. At major technology centers and national laboratories around the world, Battelle conducts research and development, designs and manufactures products, and delivers critical services for government and commercial customers. Headquartered in Columbus, Ohio since its founding in 1929, Battelle serves the national security, health and life sciences, and energy and environmental industries. For more information, visit www.battelle.org.

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ID 475 01/17

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