ADVANCED MATERIALS

Applying Advanced Methods to Solve Mission-Critical Materials Challenges

From high-performance armor to smart, anti-corrosion coatings to the products consumers buy every day, Battelle is translating advanced science into practical, mission-ready material solutions.

We have operated at the forefront of advanced materials formulation and development for nearly 100 years. Our advanced materials team uses deep scientific and engineering expertise to help our clients develop new capabilities, extend the lifetime of their current systems or products, and improve operational performance and safety. We help our clients:

- Sustain their current systems or products by replacing materials or processes with safer, longer-lasting or more sustainable alternatives.
- Add new capabilities through the use of smart coatings and materials with on-demand physical and functional properties.
- Restore failed systems by identifying failure mechanisms related to material selection, stability, degradation or process incompatibility.
- Address systems-level challenges including operational lifetime, power and energy, and durability under harsh-use conditions.
- Bring new-to-the-world capabilities to life by translating early-stage research into successful and scalable product solutions.

OUR PEOPLE

Our materials science success starts with our people. Battelle brings together world-class scientists and engineers from a range of disciplines, including chemical engineering, chemistry, materials engineering, polymer science and physics. This core group of materials researchers is supported by hundreds of people across Battelle, who work where material science intersects their specialization, such as synthetic and analytic chemistry, modeling and simulation, and characterization. No matter what you need, we can draw talent from across Battelle to assemble the right team for your specific challenge.

OUR CAPABILITIES

Every material challenge a client brings to Battelle is unique, and the approach and solution to the problem is also unique. Underlying these solutions are a core set of capabilities that we leverage to help our clients, including:

- Chemistry and Formulation (small molecules, polymers, nanostructures, biomaterials)
- Chemical and Biochemical Engineering
- Materials Engineering and Characterization
- Materials Physics, Simulation, and Advanced Systems
- Microfabrication and Coatings

OUR APPROACH

At Battelle, we translate science into real-world applications and transfer technologies across industries. We work for clients in almost every government and commercial market. Our focus is on finding solutions that will satisfy the scalability, manufacturability, stability and durability requirements of our clients. We describe this process as “Inventing to Need”: creating novel solutions to our client’s problems and discovering creative applications of existing technologies for new markets.

What Can We Help You Solve Today?

Battelle applies material science to a broad range of military, industrial and commercial applications, including:

- Bio-Based/Sustainable Materials
- Corrosion Resistance
- Protective Coatings and Interfaces
- Lightweight Materials
- High-Temperature Refractory Alloys
- Power Management/Storage
- Resiliency/Shielding
- Equipment Ruggedization
- Radiation Hardening
- Passive Infrared (IR) Signature Management
- Active IR and Visible Signature Control

BATTELLE

MATERIALS ENGINEERING

Our materials engineering capabilities are grounded in a thorough understanding of the underlying chemistry and physics of the materials with which we are working. We manipulate the chemistry and morphology at the atomic scale, nanoscale and mesoscale to develop novel materials with specified performance characteristics. We can also work with you to identify material alternatives to address safety, sustainability, economic or performance issues for existing products.

Fiber-Resin Interface Control for Strong, Durable Composites
Composites are at the forefront of high-performance materials for applications such as armor, hypersonic vehicles, wind turbines and aircraft. Although the properties of a composite are determined at the interface where the matrix meets the reinforcing fiber, the behavior of this interface under extreme use conditions is not well known. Battelle has studied the interface between polymer resins and high-strength polymer fibers to determine how to enhance this interface and increase the strength and durability of these composite materials.

Combined Visible and IR Signature Control
Controlling how a material absorbs and reflects IR radiation is used for applications as diverse as temperature control for satellites or buildings and hiding soldiers from thermal or IR sensors. Battelle's first-generation signature management technology demonstrated that it was possible to provide visible and IR camouflage using a single technology. Battelle is now developing a set of passive and active technologies that will allow equipment and personnel to control how they interact with visible and IR radiation.

CHEMISTRY AND FORMULATION

We develop new chemistry formulations to meet specific client needs. Our formulation expertise spans functional coatings, adhesives, bio-based materials and controlled release or encapsulated active materials.

Carbon Nanotube (CNT) Functional Coatings
We have created a conformable CNT heater coating that can be applied to irregular, flexible or soft substrates. The thin, flexible conductive coating delivers even heat and maintains conductivity even when bent. It can be formulated as a transparent conductor with no effect on RF communications. Battelle HeatCoat® has already been applied for aircraft deicing and other applications requiring predictable heat with minimal weight and power.

Smart Anti-Corrosion Coatings
The Battelle Smart Corrosion Detector® capsule detects and mitigates corrosion in a single step. Our innovative capsule uses encapsulation technology that triggers the release of healing chemicals as soon as corrosion is detected. The beads are mixed into paints and coatings to provide superior corrosion protection for ships, vehicles and critical infrastructure.

ADVANCED SYSTEMS

Our team applies advanced modeling and real-world testing to develop multi-component systems with materials-enabled new capabilities or functions.

Conformal Batteries
Battelle's conformal battery allows product and equipment designs to be based on end use and function rather than battery shape. This novel battery is integrated into the structure of the device, reducing overall weight while maintaining or improving performance. Potential uses include missile systems, drones, UAVs, powered armor and other applications where reducing battery weight and bulk is a priority.

First Place: 2017 "Create the Future" Design Contest, Consumer Products Category

Acute Care Cover for Severely Injured Limbs (ACCSIL)
Soldiers in the field with severe limb injuries may be hours or days away from the nearest field hospital or military base. Battelle developed a wound care cover that preserves tissue and protects the injured limb until the soldier can be safely evacuated for treatment. ACCSIL consists of a thin, conformable, tear-resistant covering for the injured limb and a bioactive coating that delivers therapies for infection control and oxygenation to preserve healthy tissue.

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.

800.201.2011 | solutions@battelle.org | www.battelle.org

BATTELLE
It can be done

ID 678 05/19