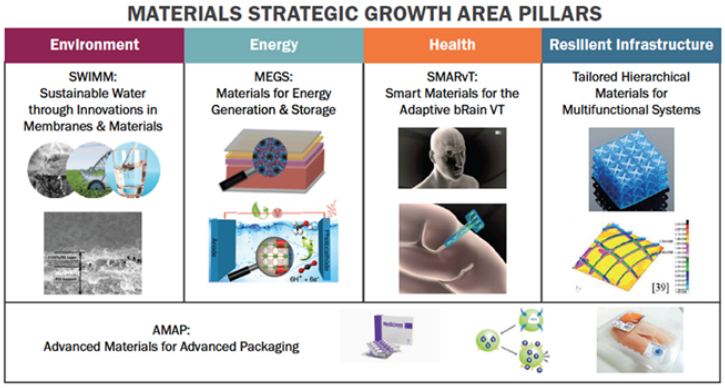
100163 - Materials Strategic Growth Area Research Workshop

Print Version

Description

The Economical and Sustainable Materials Strategic Growth Area (Materials SGA) is committed to the development of cross-disciplinary teams that will tackle critical scientific materials challenges related to our pillars of interest: health, energy, environment, and resilient infrastructure. We view these challenges through an atoms/molecules-to-systems lens, so our research and education efforts will span the full scope and sequence of materials use from discovery and computational modeling to processing, manufacturing, and implementation. Our research pillars connect our mission with those of all the existing Destination Areas and Strategic Growth areas. In particular, Adaptive Brain and Behavior, Intelligent Infrastructure for Human Centered Communities, and Global Systems Science have been identified as natural partners.

Outline



Environment – led by Stephen Martin and Robert Moore. Systems for water production, water reuse, and wastewater treatment that use less energy, are cheaper to manufacture, and can be integrated more seamlessly and efficiently into infrastructure at multiple scales: from cities, to towns, to individual dwellings, to mobile personal use. Multi-scale and multi-method design and implementation of membrane materials and processes will lead to gains in energy efficiency and scalability.

Energy – led by Louis Madsen. Safe (non-flammable) and high-density batteries, with lower implementation costs and more flexible size scales (sub-millimeters to meters) and geometries compared to existing batteries. Novel ionic materials already developed and under refinement at VT will enable this new energy storage paradigm. In combination with small-scale ambient energy harvesting devices, these will enable vast networks of sensors in buildings, in vehicles, and on or in people.

Health – led by Johan Foster. Interfaced networks within the brain to monitor and act on brain health via biocompatible implanted sensors and feedback devices. Soft materials that are physically and functionally compatible with brain tissue will yield unprecedented improvements in data quality, study longevity, non-harmful and non-perturbative monitoring, and localized administration of physical/electrical signals or drugs.

Resilient Infrastructure – led by Scott Case and Christopher Williams. Multi-scale and multi-modal manufacturing processes that integrate all of our newly designed and developed materials. Additive manufacturing (3D printing) and novel bulk material manufacturing processes will enable full control over the arrangement of atoms and molecules into hierarchical structures spanning nano, micro, and macro scales. This will provide previously inaccessible flexibility to tailor heterogeneous material properties, e.g., to build materials with multifunctional capabilities such as embedded sensing combined with structural strength and electrical conduction.

Packaging – led by Timothy Long. A world-leading center for packaging materials will redefine the term "packaging" to include the packaging of homes, partnering with our leading architecture program for efficient energy and water management (CAUS); packaging of pharmaceuticals using additive manufacturing to tailor drug delivery and ensure patient compliance (COE); stimuli-responsive packaging for controlled delivery of agricultural fertilizer to minimize environmental impact (CALS); smart packaging and distribution to indicate food safety, quality and inventory (CNRE); and the packaging of electronic devices with attention to recyclability, sustainability, and the reduction of electronic waste (COS).

Notes

Are you interested in presenting a workshop or poster at the Materials Strategic Growth Area Workshop? Complete the survey in the link below to be considered. All submissions are due by Friday, August 18.

https://virginiatech.qualtrics.com/jfe/form/SV_a36zV3I5cls1Qt7 (https://virginiatech.qualtrics.com/jfe/form/SV_a36zV3I5cls1Qt7)

Thank you for your interest in this course. Unfortunately, the course you have selected is currently not open for enrollment. Please complete a Course Inquiry so that we may promptly notify you when enrollment opens.

Request Information