Technology Assessment and Transfer, Inc.

Bridging the gap between technology and the marketplace



Leadership in Advanced Ceramics, Composites, Coatings, and Transparent Armor Solutions



Technology Assessment and Transfer (TA&T) aims to establish relationships with industry partners – including prime contractors, system integrators, OEM's, and distributers – the Department of Defense, and other agencies to incorporate cutting edge research and development in the materials field to the marketplace.



MISSION AND VISION

Mission

TA&T has a mission to transition advanced materials and process technologies from a laboratory environment to commercial products and services. The gap between the laboratory and marketplace is bridged by maintaining world-class research and development and prototyping capabilities, establishing subsidiary manufacturing companies for low to medium volume defense and aerospace markets, and by licensing material and process technology to high volume manufacturing companies.

Core Competencies

TA&T is an engineering focused company with 90% of the professional staff degreed engineers and 75% of the engineering staff with advanced technical degrees. The Senior Staff has over 100 years of combined experience in executing Government funded materials-focused R&D programs.

- Transparent Ceramics
- Ceramic Micro Devices
- Ceramic Stereolithography
- Direct 3-D Manufacturing
- Thermal Management
- Scintillation Materials

- Fiber Ceramic Matrix Composites
- Strengthened Carbon Foams
- Metal/Ceramic CVD Coatings
- Magnetron Sputtering
- Laser Gain Media
- R&D Consulting Services

PRODUCTS AND SERVICES

Advanced Ceramics & Coatings

The Advanced Ceramics and Coatings Group works with structural materials that bring a broad spectrum of capabilities and material combinations for an array of aerospace and industrial applications

Carbon Foams

TA&T developed a Structurally Enhanced Carbon Foam by coating the individual ligaments of commercially available open celled foams with a polymeric ceramic precursor. The coating produced a two-time or greater increase in the compressive strength of commercial carbon foams with only a 5% reduction in thermal conductivity.

In conjunction with the Department of Energy, TA&T has designed, constructed, and tested Structurally Enhanced Carbon Foam in a real world environment which validated laboratory results.

Ceramic Matrix Composites

Through advanced powder processing consolidation of ceramics, chemical vapor infiltration, and polymer infiltration and pyrolysis of ceramic and ceramic/metal composites, TA&T is pushing the boundaries of ceramic material capabilities.

Continuous and discontinuous fiber reinforced refractory ceramic, graded ceramic and graded refractory metal-ceramic composites are ideal for rocket engine and hypersonic missile applications.



Structurally enhanced carbon foam blocks, machined for use as heat sinks.



Alternating layers of niobium carbide deposited between graphite and epoxy, destined for nuclear space propulsion.

Ceramic Stereolithography

Ceramic stereolithography (CSL), a form of 3D printing and additive manufacturing, is a rapid prototyping and manufacturing process that uses photocurable resin filled with a high loading of ceramic powder to produce ceramic parts using laser stereolithography machines. Through digital manufacturing, hundreds of complex shapes can be manufactured simultaneously.

The advantages of CSL are numerous:

- Direct manufacturing from computer design files
- Fine features 0.008 in. (0.2 mm)
- Intricate geometries unobtainable from traditional manufacturing
- No part-specific tooling required reduction in lead times by as much as 8 weeks

The attributes of CSL make it an ideal manufacturing process for microfluidic coolers for electronic and microelectromechanical devices, medical devices such as surgical instrument tips, processing membrane supports, and casting consumables.



Complex shapes in process of being manufactured by Ceramic Stereolithography.



Intricate helix shaped membrane supports for gas separation, unattainable by traditional processes like injection molding.

PRODUCTS AND SERVICES

Spinel & Optical Ceramics

TA&T has a long history with transparent optical ceramics, particularly transparent polycrystalline Magnesium Aluminate Spinel (MgAl2O4) and other optical ceramics for armor and optical applications.

The suitability of Spinel for transparent armor and electro-optic applications stems from its inherent hardness, stopping power and extended transmission range in mid-wave IR (0.2-6.5 μ m). Due to continually increasing performance requirements of current and next-generation electro-optic platforms and armor systems, demand for transparent Spinel is greater now than ever before, and the reproducibility has reached a point where Spinel is a commercially viable product.

Optical ceramics such as Nd:YAG and Ti:MgAl2O4 have recently become viable materials for ceramic polycrystalline laser gain media, and advances in polycrystalline ceramics for laser applications has significant crossover with polycrystalline materials for scintillators, including cerium doped lutetium orthosilicate (LSO).



Magnesium Aluminate Spinel, from its raw powder form to finished, polished parts



Multiple Spinel domes, produced at TA&T, ready to protect sensitive electro-optic sensors on missiles.

Thermal Management

TA&T is actively involved in the development of thermal management solutions for various military, aerospace, and commercial applications.

Innovations in ceramic cold plates with microchannels, twophase loop systems with high pumping and heat transport capabilities, thermal energy storage systems that provide supplemental cooling with operating flexibility and materials that provide enhanced thermal characteristics (e.g., high thermal conductivity, high heat capacitance, and high capillary pumping) are foundational technologies that enable revolutionary changes in a range of industries.



Rendering of a waste heat recovery unit for electrical power generation, designed by TA&T.

- Microchannel Cooling
- Thermal Energy Storage
- Two-Phase Heat Transfer
- ▶ Single-Phase Heat Pipes
- ▶ Two-Phase Loop Heat Pipes

COMPANY PROFILE AND MANAGEMENT

Founded in 1982 by Dr. Larry Fehrenbacher, Technology Assessment and Transfer is high-technology corporation that develops and commercializes advanced materials for defense, bio-medical and industrial applications.

Dr. Larry Fehrenbacher has an extensive materials R&D, manufacturing, technology, and technical management background based on a 20-year career in the U.S. Air Force, 15 years of which were spent in the laboratories at Wright-Patterson AFB, and 5 years in Washington as a special assistant to the Chief Scientist of Air Force Systems Command, Dr. Kulp and Dr. Arden Bement, Deputy Under Secretary of Defense for Research and Advanced Technology.

CUSTOMERS AND PARTNERS

Technology Assessment and Transfer, Inc. takes pride in providing products and services for a variety of industry partners, public and private universities, federal laboratories and agencies.

Past customers, partners, and funding sponsors include the Army Research Lab (Aberdeen), Los Alamos National Lab, DARPA, the Jet Propulsion Laboratory, SOCOM, Missile Defense Agency, NASA/ Marshall Space Flight Center, University of Illinois, Johns Hopkins University, University of Maryland, Clemson University, the U.S. Naval Academy, Lehigh University, and Honeywell.

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