DE-FOA-0000977 CLEAN ENERGY MANUFACTURING INNOVATION INSTITUTE FOR COMPOSITE MATERIALS AND STRUCTURES

TEAMING PARTNER LIST

UPDATED JUNE 23, 2014

Organization	Contact Name	Organization Type	Area of Technical Expertise	Description of Capabilities	Contact Information
Michigan State University Composite Manufacturing and Dynamics Laboratory	Professor Dahsin Liu, Dept. of Mechanical Engineering	Education and Research	1. patent-pending quasi-three-dimensional (Q3D) woven composites with higher stiffness, strength, impact resistance and delamination resistance than conventional composites 2. advanced testing facilities for performing dynamic tests ranging from low to high strain rates including indentation, impact, crash and blast 3. innovative peridynamic computational code for simulating composite structures under violent environments	1. designing and manufacturing composites from fiber weaving/braiding to structure assembly 2. testing composite materials and structures from low to high strain rates to simulate real-world environments 3. modeling composite response under dynamic loading with the innovative peridynamic method	Address: 2727 Alliance Drive, Lansing, Michigan 48910 Email: liu@msu.edu Phone: 517-353-6716
Sandvik Coromant	Linn Win	Manufacturer	Composite Machining	1. Composite Machining 2. CAD/CAM Programming 3. Machining Optimization & Turnkey Projects 4. Research & Development 5. Engineering 6. Tool Design & Manufacture	Address: 1702 Nevins Rd Fair Lawn, NJ 07410 Email: Linn.Win@sandvik.com Phone: 214-675-3263
University of New Haven	Prof. Ravi Gorthala	University-Research and Education	Patented Next Generation Pultrusion Technology for Hybrid and Thick Cross-Section Composites	Process Development and Process Modeling	Address: 300 Boston Post Road, Mechanical Enginering, Buckman 111, West Haven, CT 06516 Email: rgorthala@newhaven.edu Phone: 203-479-4119
Terrafore Technologies, LLC	Anoop Mathur, CTO		Advanced Process Control	Developed advaned controllers for manufacturing of carbon composites. Specifically, advanced controller fro fiber impregnation that reduced the production time by 50%, advanced control of carbonization and autoclave curing process to improve quality, consistency while reducing batch process time to manufacture composite. Also, developed mathematical models and controllers for chemical vapor infiltration of carbon composite parts using a rapid CVI method.	Address: 100 South 5th st, suite 1900, Minneapolis, MN 55402 Email: anoop.mathur@terrafore.com Phone: 951-313-633

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GLWN, Global Wind Network	Patrick Fullenkamp	Non-profit	Supply Chain Advisory organization (consisting of Engineers and Manufacturing Professionals) for Wind Turbine OEMs, Major Tier 1's, Wind Farm Developers, and Manufacturers	International Supply Chain Advisory Group with a Mission of Increasing the domestic content of North America's Wind Turbines and Farms. We are Supplier Headhunters for the Wind Industry and a Resource for Suppliers and Service Providers. Developed an on-line GIS Wind Supply Chain Map for Land Based and Offshore. Recently conducted a study for the U.S. Department of Energy "U.S. Wind Energy Manufacturing and Supply Chain: A Competitiveness Analysis - DE-EE-0006102". This study resulted in a detailed global (USA, Europe, China) cost assessment of large Blades, Towers, Jacket Foundations, and Direct Drive Permanent Magnet Generators. The study also identified potential offshore suppliers and a Red-Yellow-Green Industry Capability Scorecard.	Address: 4855 West 130th Street, Suite 1, Cleveland OH 44135 E-mail: Patrick@glwn.org Phone: 1.216.920.1965 or Cell 1.937.269.2378
Creare	Dr. Jay C. Rozzi, Principal Engineer	Small Business	Advanced Manufacturing, Systems Development and Integration, Technology Transition	Laser-Based Heating Systems with Integrated Feedback Control for Consolidation of Thermosetting Composites and Curing of Thermoplastics; Cryogenic Machining of Composite Materials; Non-Contact "On-the-Fly" Measurement Systems for Composite Part Inspection	Address: 16 Great Hollow Road, Hanover, NH 03755 Email: jcr@creare.com Phone: Office 603-640-2367 Mobile 603-219-4464
South Dakota State University	Prof. Jikai Du	Education and Research	Composite material property evaluation	1. Various nondestructive techniques, including ultrasound guided waves, ultrasound phased array, acoustic emission, eddy current, X-ray CT, etc. for the evaluation of the integrity and property of composite materials and structures. 2. Experimental composite material evalution at nano scale by laser scanning microscopy and nanoindentation technique. 3. Composite mechanical testing at high temperature.	Address: South Dakota State University, Mechanical Engineering Department Box 2219 SCEH 236 Brookings, SD 57007-0294 Email: jikai.du@sdstate.edu Phone: (605) 688-5930
Advanced Forest-based Polymer Materials Center, Forest Biomaterials Dept., NCSU	Dr. Richard Venditti	Public University	Extraction of polymeric materials from plants, conversion of plant materials to polymers and products, lignin carbon fibers, superabsorbants based on hemicellulose, microfibrillated and nanofibrillated cellulose, cellulose and synthetic polymer composites, life cycle analysis of bioproducts.	Lab and pilot scale processing of wood materials. Chemical laboratories for conversion of plant materials, polymer compounding, extruding, fiber spinning, physical and thermal testing of bioproducts, life cycle analysis software tools and data for bioproducts.	Address: 431 Dan Allen Drive, 1229 Pulp and Paper Labs, Raleigh NC 27695 Email: Richardv@ncsu.edu Phone: 919 515 6185

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The University of Texas at Austin Center for Electromechanics	Dr. Robert Hebner	University Education and Applied Research	1. Design and Testing of High-Strength Carbon Fiber Composites 2. Modeling, Simulation, and Analysis of Composite Materials 3. System level application testing of Composite prototypes	The University of Texas at Austin (UT) has, for decades, been leading in research, development, manufacturing, and testing of composite materials and systems. Researchers have extensive experience in developing new manufacturing methods for improving composite performance and reducing cost. UT's unique facility includes specialized software for composite design, along with testing fixtures and techniques for assessing composite performance. Example applications include: • A gigawatt-class pulsed electrical generator in which nearly all structural components are composites • A set of composite arbors for a superconducting generator • The world's largest composite flywheel storing about 150 kWhr • Composite flywheels for transit buses • Composite retaining rings for high tip speed permanent magnet motors and generators • Very high tip speed composite flywheels, reaching speeds of about 1.4 km/s • Flywheels that operated through more than 110,000 charge/discharge cycles with no discernible signs of aging • Thin walled composite cylinders that always opened outward when sliced parallel to the axis of the cylinder. This requires prediction and control of residual stresses.	Address: 10100 Burnet Rd. Bldg 133, Austin, TX 78758 Email: r.hebner@cem.utexas.edu Phone: 512-232-1628
Nexight Group LLC	Warren Hunt, Chief Technical Officer	Consulting (Small Business)	Technology Roadmapping, Strategic Planning, Workshop Facilitation, Opportunity Development, Communications, Materials/Manufacturing	We have recently assisted clients in the following: • Roadmap for Plastics and Polymer Composites in Automotive Applications • Implementation Guide for Integrated Computational Materials Engineering in Aerospace, Automotive, and Marine Industries • Advanced Manufacturing Environmental Scan • Launching a Materials Data- and Information Sharing-Network	Address: 8403 Colesville Road, Suite 1240 Silver Spring, MD 20910 Email: whunt@nexightgroup.com Phone: (240) 493-8076 (desk) (724) 759-0211 (mobile)
PARC a Xerox company	Gabriel Iftime, PhD	Commercial	- Printing based deposition methods - Materials design and formulation	- Development of novel methods for materials deposition - Design and fabrication of functional polymer composite materials - Fiber/polymer matrix modification & compatibility	Palo Alto Research Center (PARC) Address: 3333 Coyote Hill Road Palo Alto CA 94304 Email: Gabriel.Iftime@parc.com Phone: 650.812.4245

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Harper International Corporation	Diana Robbins	Manufacturer	Thermal processing conversion technology of multiple precursor chemistries and formats to fibrous materials for composites forming	Development of custom thermal process technology for fiber conversion, ranging from small scale (one tow) scientific systems to full production lines. Advanced R&D facilities for process feasibility testing and analysis. Expertise in heat transfer, design of experiments, surface technology, morphology, thermo-chemical analysis, high temperature chemistry, gas–solid reactions, high temperature alloys and refractories, and thermal, thermal stress, process, structural, and fluid flow modeling.	Address: 4455 Genesee Street Buffalo NY 14225 Email: drobbins@harperintl.com Phone: 716-684-7400
The Catholic University of America	Jandro L. Abot	University Education and Research	Science and Technology of Composite Materials. Structural Health Monitoring of Plastics and Composites using Carbon Nanotube Yarns (new technique that provides highly integrated, distributed and simple strain measurement and initiating damage detection in real time).	Fabrication, Sensor Integration and Mechanical/Electrical Characterization of Polymeric and Composite Materials	Address: 620 Michigan Avenue NE, G21 Pangborn Hall, Washington DC 20064 Email: abot@cua.edu Phone: 202-319-4382
Michelman, Inc.	Andrew Brink	Manufacturing	Sizings and Surface Treatments	Michelman's Fibers and Composites business unit is a global leader in supplying fiber manufacturing companies with sizings and surface treatments to improve the manufacturability, processability and mechanical properties of fiber reinforced composites. We currently supply both glass and carbon fiber companies.	Address: 9080 Shell Road, Cincinnati, OH 45236 Email: AndyBrink@Michelman.com Phone: (919) 632-3936
Usable Glass Strength Coalition	Alastair N. Cormack	For profit (wholly owned subsidiary of Glass manufacturers Industry Council (GMIC), a not-for-profit organization)	Glass Fibers	research and manufacturing of silicate-based glass	Address: NY State College of Ceramics, Alfred University, 2 Pine St., Alfred, NY 14802 Email: cormack@alfred.edu Phone: 607-871-2304

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Herty Advanced Materials Development Center	David E. White	An applied research center of Georgia Southern University focused on research, development, and demonstration	• Wet laid forming and scale up of composite materials with multiple fiber types including glass, carbon, synthetic, and natural fibers • Scale-up production of engineered light-weight composites • Nanomaterials and nano-based composites • Materials reuse in engineered products and systems • Bio-based performance materials such as high performance fibers, adhesives and coatings	• Three pilot wet laid nonwoven machines, 1-10 tpd; calendering • Pulping, recycling, stock preparation • Pilot integrated biomass processing, size reduction, densification, conversion • Scale-up demonstration facilities • Physical testing, chemical and thermal analysis	Address: 110 Brampton Road, Savannah, GA 31408 Email: dwhite@herty.com Phone: 912-704-8386
University of Iowa, Laser Materials Processing Lab	Prof. Hongtao Ding	University	Laser-based manufacturing, repairing of composites, joining, machining.	Laser joining of composites, machining of composites, laser machining, wind turbine manufacturing, process modeling.	Address: 2410 Seamans Center, Iowa City, IA 52242 Email: hongtao-ding@uiowa.edu Phone: Tel: (319)335-5674
Western Kentucky University	Dr. Muhammad Jahan	Public University, Education and Research Engineering and Manufacturing Commercialization Center of the Advanced Materials and Manufacturing Institute	Non-conventional machining, micro-EDM, micromachining, Advanced Manufacturing	1. Machinability study of composite materials at micro-scale, 2. Micro-EDM machining of composite materials, 3. Laser machining and engraving of composite materials, 4. Surface modification and mechanical properties changes of composite materials after different machining processes	1906 College Heights Blvd 51066 Bowling Green, KY 42101-1066 Office: EST 217 Phone: (270) 745-2176 (Office) Fax: (270) 745-5956 E-mail: muhammad.jahan@wku.edu
Western Kentucky University	Dr. Quentin Lineberry	Public University Education and Research	Materials Characterization	Characterization of materials (polymer, reinforcement filler, and composite) including thermal analysis, X-ray diffraction, atomic force microscopy, scanning electron microscopy, infrared analysis. Also experts in evolved gas analysis to identify products of combustion or pyrolysis.	Dr. Quentin Lineberry quentin.lineberry@wku.edu

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Western Kentucky University	Dr. Hemali Rathnayake	Public University Education and Research Advanced Materials and Manufacturing Institute	Expertise in preparation of organic-inorganic nanocomposites and polymer composites as promising materials for thermoplastics for thermoeelctric generators and light weight flexible solar cells. Expertise in device characterization for organic solar cells and organic thermoelectrics	1. Well-equiped sysnthetic lab for the preparation of hybrid nanocomposites and polymer composites. 2. Electrical characterization facilities including fabrication of photovoltaic test devices. 3. Thermal and electrical conductance characterization facilities	270-745-6238 hemali.rathnayake@wku.edu
Western Kentucky University	Dr. Yan Cao	Public University Education and Research Institute for Combustion Science and Environmental Technology	Characterization of Composite Materials; Preparation of Graphene-enhanced composite materials; Laser-curled graphene materials	1. Materials Characterization: Viscosity, Density and Thermal Conductivity and thermal analysis for material Stability under elevated temperatures. ICSET has a well-equipped Thermal-Chemistry-Physics Laboratory; 2. Integrated indentification method using Raman, IR, fluorescence and AFM. ICSET is working on an integration approach to identify material properties in-situ during synthesis, composting and extruding process of composite materials, and providing signature properties of composites in aspects of their chemical structures and surface images, a newly setup clean-room facility is well suited for this purpose; 3. a 3-D patterning assemble platform, achieving integrated material synthesis and extrusion process of composite sheets at different shapes and scales.	Dr. Yan Cao 270-745-2224 cell: 270-779-0202 yan.cao@wku.edu
Western Kentucky University	Dr. Aaron Celestian	Public University Education and Research Advanced Materials Institute	Synthesis and characterization of porous nanomaterials Real time in operando materials analysis and characterization	Powder and single crystal X-ray diffraction Raman microscopy Inductively coupled plasma spectroscopy Simultaneous thermogravimetric analysis and differential scanning calorimery Gas and Liquid chromotography and mass spectroscopy Materials synthesis Polarized light microscopy	Dr. Aaron Celestian 270-745-5977 aaron.celestian@wku.edu

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Western Kentucky University	Dr. Edward Kintzel	Public University Education and Research Non-destructive Analysis Center	Large-Chamber Scanning EM Backscattered Electrons, Energy dispersive spectroscopy, electron backscatter diffraction, fourier transform infrared spectroscopy, variable pressure SEM and in-situ load frame	Large Chamber Scanning Electron Microscope used for nanometrology, characterization and analytical services for samples ranging from 1.5 m in diameter and 650 lbs to 50 nanometers LC-SEM for in-situ observations of deformation behavior of materials Only instrument of its type available in the U.S.	Dr. Edward Kintzel edward.kintzel@wku.edu
Autodesk, Inc.	Diego Tamburini	Software	Engineering and Manufacturing software	Software tools for design and simulation of composite materials, laminates and structures	Address: 111 McInnis Parkway, San Rafael, CA 94903 Email: diego.tamburini@autodesk.com Phone: +1 971 238 5599
The Boeing Company	Marlene Price	Commercial Manufacturer	Major aerospace manufacturer leveraging broad based on enabling technology development/testing/validation and implementation expertise including composite materials and structures spanning more than 40 years in many different environments, applications, prototype and production scenarios, certification agency expectations, materials, structural concepts, toolsets, and stages throughout the total lifecycle of a program or application.	Experience accelerating processes to achieve rates; Development of energy efficient processes; A network for development of recycling technologies which has resulted in production scale recycling of resinated and dry carbon fiber byproduct streams into applications; Innovative Design Concepts including crashworthiness, damage tolerant structures, fire mitigation, and reliability trade-offs; Modeling and Simulation Tools for materials, processing, design, and assembly; Effective joining techniques; Defect detection; etc.	Address: The Boeing Company P.O. Box 3707 MC 19-FC Seattle, WA 98124-2207 Email: marlene.y.price@boeing.com Phone: (206) 544-2201
The National Nuclear Security Administration, Y-12 National Security Complex	Dennis B. Miller	Federal Facility	Information Security Applications	Y-12's Manufacturing Innovation Network (MIN) is an enabling technology providing a secure collaborative network that protects Intellectual Property, business & technologically sensitive information, models, and codes to optimize innovation and productivity while preventing espionage/sabotage by those not part of the vetted supply chain.	Address: Y-12 National Security Complex PO Box 2009 Oak Ridge, TN 37831-8284 Email: millerdb@y12.doe.gov Contact Phone: 865.241.9590

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Lumyn Technologies LLC	Arzu Ozkan	Small Business LLC	Laser Machining	We develop process recipes for lasers used in manufacturing biomedical, solar and consumer products and provide rapid prototyping services and contract manufacturing.	Address: 897 Independence Ave, #2E, Mountain View, CA 94043 Email: a.ozkan@lumyntech.com Phone: 408-823-6485
Southern Illinois University	Dr. Ian Suni	University Research and Education	• Non-destructive evaluation • Spacecraft and satellite design using carbon epoxy composites • Composite aircraft repair • Mechanics of laminate composite materials. • Finite element and other analyses of composite structures • Whole-field thermal diffusivity measurements • Bond line assessment of carbon composite joint • Short carbon fiber reinforced composites for automobiles • High-speed flywheels for energy storage. • Multi-layered composite pipes under internal pressure and thermo-mechanical loading	• Modeling, analysis, design and testing of composite materials for dynamic structures. • Immersion and air-coupled ultrasonic systems • Infrared thermography system • Digital Image Correlation (DIC) for deformation measurement. • Mechanical characterization of composites (i.e. tensile tests, composite joint shear tests) • MTS and Instron testing machines. • The Department of Aviation Technologies (AVT) and the Department of Automotive Technologies are housed in four buildings: The AVT building, the Transportation Education Center, the Helicopter Laboratory located 300 yards west of the AVT building, and the Aviation Engine Test Cell located across the street from the Helicopter Laboratory. • The Composites Laboratory is over 1000 square feet with nine work stations equipped for wet-layup or prepreg fabrication. Each station is equipped with individual tools and vacuum sources. A separate down-draft sanding area designated for composite repairs. Equipment available within the laboratory for composite testing includes hot bonder controller/recorder, Ultrasonic leak detector, and a digital electronic tap hammer.	Address: Materials Technology Center Southern Illinois University 1230 Lincoln Drive Mail Code 6603 Carbondale, Illinois 62901 Telephone: (618) 453-7822 e-mail: isuni@siu.edu
Element Materials Technology	David Podrug - Advanced Materials Business Manager	Large corporation with 26 locations in the US.	Three Centers of Excellence are currently located in California; Non-Metallic Testing (Composites), Non Destructive Testing and Metal Testing.	We provide testing services of composite materials with over 40 years experience. Our expertise includes chemical, physical, thermal, mechanical, fatigue, electrical, NDT and flammability property testing among others. We can also provide panel fabrication, specimen preparation, secondary bonding, conditioning and environmental susceptibility services. Our data quality is highly reliable and reproducible. Reporting includes fully documented chain of events complying with strict quality standards accredited by ISO 17025 and NADCAP. We also specialize in customized test projects requiring unique configurations, conditions and strain capture.	Address: 15000 Bolsa Chica Street, Huntington Beach, CA 92649 Email: david.podrug@element.com Phone: (949) 374-9759

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Rapid Response Manufacturing Center (RRMC), University of Texas - Pan American	Professor Anil K. Srivastava, Manufacturing Engineering Department	University Education and Applied Research	Laser-based Manufacturing, precision machining/grinding, tooling, nanomaterials and nano-carbon-fiber-based composites, testing, validation, and material characterization, and advanced manufacturing,	Machinability studies of composite materials at micro- and macro-scale level, composite machining (drilling/milling/turning..), tool design and manufacture, process development, modeling (FEA) and process optimization, testing and analysis, capabilities of mass production of carbon nano-fibers, and carbon fiber reinforced composites, characterization of composite materials (polymer, reinforced filler, and composites), composites material properties evaluation	Address: University of Texas Pan American 1201 West University Drive, Edinburg, Texas 78539-2999 Email: srivastavaak@utpa.edu Phone: 956-665-8947 (Office)
University of Missouri Research Reactor	Dr. John Gahl	Public Institution of Higher Education	16.5 MeV Cyclotron	Cyclotron with capability of accelerating protons to 16.5 MeV (available current of 100 uA), or deuterons accelerated to over 8 MeV (available current of 60 uA) for materials investigations, such as the hardening of polymeric materials through cross linking or the pitting of fibers to effect adhesion in composites.	Address: 1513 Research Park Drive; Columbia, MO 65211 Email: GahlJ@missouri.edu Phone: 573-882-4211
Ohio Aerospace Institute	Ann Heyward, Executive Vice President	Non-profit research	(1) computational materials modeling for analysis and design of new alloys (high temperature intermetallics, superalloys, shape memory alloys) and surface phenomena (surface alloys, thin films), including software development for PC-based alloy design at the atomic level; (2) processing methods for advanced metallic materials, including optimization of processing parameters for new copper-based alloys; (3) microstructure/property relationships for ceramic matrix composites focusing on the constituent, architecture and environment effects on the mechanical behavior of SiC/SiC composites and use of modal acoustic emission to characterize sources of local damage accumulation; (4) development and characterization of high-temperature alloys, including NiAl-base composites, foam sandwich structures for fan containment, ultralight high-temperature alloys and lightweight fan blade materials; (5) modeling in the nanoscale	• Program management • Pre-competitive research consortia • IP Management • Advanced materials, structures and manufacturing technologies • Computational fluid dynamics • Thermal management • Harsh environment sensors • Communications • Diagnostic/prognostic health management	Address: 22800 Cedar Pt Road. Cleveland, Ohio Email: AnnHeyward@oai.org Phone: 440-962-3000

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Organization	Contact Name	Organization Type	Area of Technical Expertise	Description of Capabilities	Contact Information
Sherwood RTM Corp	Ron Brookes	Small Business	Designing and building unique tooling to accomplish manufacture of compound configured product with exacting requirements. Design of resinous composites for specific strength requirements, electrical and thermal transfer ability.	Of particular interest to this FOA-0000977 is our past experience with replacing the costly process of oven curing large composite parts such as missile casings with energy saving RTM process and with the utilization of heat mitigating tooling being able to conserve the heat content for addition production. We have 18ft. curing ovens, multiple clean room stations, computer controlled fabric cutting machine, 5 Liquid Control RTM machines and fully qualified operators.	4043 Beck Ave. Louisville, Ohio 44641. Email: ron@sherwoodcorp.com 1-330-875-7151