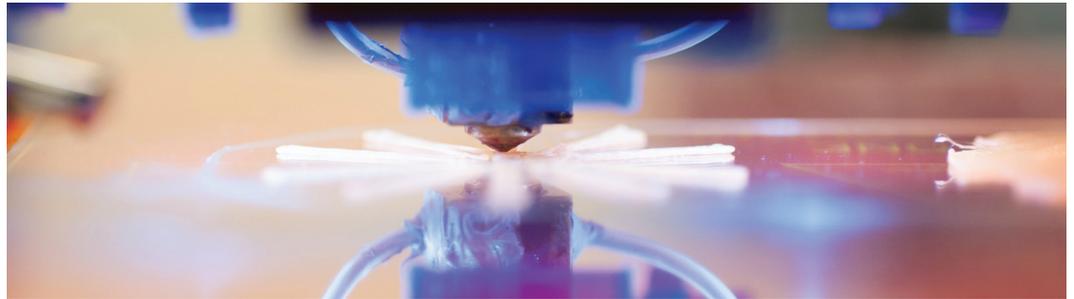


RAMP MD Symposium • March 4, 2016

New Frontiers of Bio-Medical Additive Manufacturing

A symposium to explore new bio-medical applications of additive manufacturing and 3D Printing



The Board of the Regional Additive Manufacturing Partnership of Maryland (RAMP MD) is pleased to offer its second symposium, "New Frontiers in Bio-Medical Additive Manufacturing." The symposium's goal is to explore how additive manufacturing is impacting the health and bio-medical industry and to bring together potential partners and collaborators.

RAMP MD, formerly known as the Northeastern Maryland Additive Manufacturing Innovation Authority, was formed by the Maryland General Assembly in 2014 to expand the state's capabilities in additive manufacturing. Additive manufacturing represents a significant opportunity for the state of Maryland to be at the leading edge of a technology that is going to dramatically reshape how we live, work, and play. This is because Maryland is home to federal lab facilities that have already made multi-million dollar investments in additive manufacturing equipment and resources.

RAMP MD has streamlined the process for businesses to partner with federal labs via an overarching CRADA, which is currently utilized by 13 industry partners from across

Maryland. In addition to increasing the number of businesses taking advantage of this unique partnership opportunity, RAMP MD is also working to create educational pathways into additive manufacturing careers, and to build a strong, highly visible, additive manufacturing infrastructure that promotes businesses' success in this industry.

Nowhere is additive manufacturing revolutionizing an industry more than in bio-medical applications. 3D printed medical devices and prosthetics are already commonplace in patient care. Similarly, we are quickly moving toward the day when 3D printed organs and tissue replace current transplant methods. Bio-medical additive manufacturing is resulting in shorter and less invasive surgery, faster recovery, reduced cost, and expanded capabilities.

We are pleased you are attending this event. Look for presentations and additional information on today's event to be posted to the RAMP MD website at www.rampmd.org.

Rick Decker
Executive Director, RAMP MD
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RAMP MD



About the Cecil County School of Technology

The new Cecil County School of Technology offers a wide range of career and technology education programs for students, such as computer science, automotive mechanics, health care, construction trades, homeland security, and more. Many students

are pursuing professional certifications and license opportunities while in high school. Formerly a manufacturing facility operated by Basell, the 160,000-square foot facility was renovated last year and opened to its first students in fall of 2015.

Speakers and Panelists

Bradley R. Ringeisen, Naval Research Laboratory

Bradley Ringeisen is head of the Bioenergy and Biofabrication Section at the U.S. Naval Research Laboratory. Ringeisen is considered a pioneer in the field of live cell printing having demonstrated the first living bacteria and mammalian cell printing experiment using modified laser induced forward transfer (LIFT) technology. Ringeisen graduated with a B.S. in chemistry from Wake Forest University in 1994. He holds a PhD in Physical Chemistry from University of Wisconsin.

Michael Maher, Defense Advanced Research Projects Agency (DARPA)

Michael Maher's interests include development of new technologies to reduce the manufacturing cycle time and novel lightweight multifunctional material systems. Maher came to DARPA from the Army Research Laboratory where he was Chief of the Composite and Hybrid Materials Branch and Materials Applications Branch. He holds a Bachelor of Science degree in Chemistry from Loyola College in Maryland.

Peter Liacouras, Walter Reed National Military Medical Center

Peter Liacouras is the Director of Services for the 3D Medical Applications Center at the Walter Reed National Military Medical Center in Bethesda, MD. Since 2006, he has applied additive manufacturing techniques such as vat photopolymerization, material jetting, binder jetting, and powder bed fusion to medical applications and implant designs. Liacouras holds a Bachelor of Science degree in Biology and Mathematics from James Madison University and a Master of Science, as well as a Doctor of Philosophy, in Biomedical Engineering from Virginia Commonwealth University.

Michael Ellis, WL Gore

Michael Ellis is a medical device professional with broad experience from the concept development phase through product end-of-life. Ellis' interests include the development and

commercialization of new products and technologies that offer significant improvements in healthcare delivery, and developing and driving new product and technology concepts from the ground up. Ellis holds a B.S. in electrical engineering from Bucknell University and a Ph.D. in Biomedical Engineering from the University of Virginia.

Harry MacArthur, Terumo Medical

Harry MacArthur is vice president for manufacturing and product development at Terumo Medical, a manufacturer of medical devices and accessories. MacArthur's focus is on business improvement, strategy development, Lean/Six Sigma deployment, manufacturing rationalization, change management, and in building high performance teams. MacArthur holds a bachelor's degree in electrical engineering and a certificate in World Class Manufacturing.

David Kuraguntla, GraftWorx

David Kuraguntla is founder and CEO of GraftWorx, a Harford County-based company that integrates sensors with bypass grafts and stents. David was about to begin a surgical residency when the need for these devices, and his subsequent invention of the device, put him on an entrepreneurial path. Prior to founding GraftWorx, Kuraguntla served in the United States Air Force and worked with the National Institute on Drug Abuse. Kuraguntla earned a B.S. in Biochemistry, and completed medical school at West Virginia School of Osteopathic Medicine.

Neil Davis, TEDCO

Neil Davis serves as TEDCO's Director of Entrepreneurial Development. In this role, he draws on his extensive experience in business to serve as the organization's liaison with technology incubators statewide and works to develop new strategies for supporting start-ups in Maryland. He also manages TEDCO's educational efforts for its portfolio companies, advises companies on business pitches to investors, and assists in planning the annual TEDCO Entrepreneur Expo. He brings more than 20 years of experience in business development, business consulting, and profit and loss responsibility.

Agenda: New Frontiers of Bio-Medical Additive Manufacturing

TIME	EVENT	SPEAKER
7:30	<i>Registration, Refreshments, and Exhibition Hall Networking</i> Symposium Room B and 1st and 2nd Floor Hallways	
8:30	General Session	
	<i>Opening Remarks</i> Symposium Room A (second floor)	<ul style="list-style-type: none"> • David Dollenger, Cecil County Public Schools • Maryland Senator JB Jennings • Michael Abaie, US Army Edgewood Chemical Biological Center • Barry Glassman, Harford County Executive • Dan Schneckenburger, Cecil County Council
8:45	General Session	
	<i>What's New in Government Research and Development in Additive Manufacturing for Bio-Medical Applications</i>	<ul style="list-style-type: none"> • Bradley R. Ringeisen, Naval Research Laboratory • Michael Maher, DARPA Defense Sciences Office • Dr. Peter Liacouras, Walter Reed National Military Medical Centers
9:35	General Session	
	<i>Spotlight on Regional Additive Manufacturing Capabilities</i> Moderator: Lisa Webb, Director of Economic Development for Cecil County	<ul style="list-style-type: none"> • Michael Ellis, WL Gore • Harry MacArthur, Terumo Medical • David Kuranguntla, GraftWorx
10:15	Networking in exhibit hall	
10:45	Break-Out Sessions	
Room D163	<i>Exploring Prototyping and Manufacturing Devices</i> Moderator: Neil Davis, TEDCO	<ul style="list-style-type: none"> • Mike Adelstein, Potomac Photonics • Josh Barnes, Harbor Designs • Brad Ruprecht, Army Rapid Prototyping Lab • Greg Paulsen, Xometry
Room C249.2	<i>Rehabilitation and Wearable Health Technology</i> Moderator: Ken Malone, Early Charm Ventures	<ul style="list-style-type: none"> • Elisa Arch, University of Delaware • Stephen Fisher, Chesapeake Employers Insurance • Eric Wetzal, Army Research Laboratory
Room D161	<i>The Future of Additive Manufacturing for Medical Applications</i> Moderator: Martha Connolly, University of Maryland	<ul style="list-style-type: none"> • Warren Grayson, Johns Hopkins Grayson Lab for Tissue Engineering • Michael Raphael, Direct Dimensions • Chad Schneider, Root3 Labs
11:45	General Session	
	<i>Closing Remarks</i> Symposium Room A	<ul style="list-style-type: none"> • Congressman Andy Harris, Maryland 1st District
12:00	<i>Employer's Roundtable Discussion Panel and Lunch</i> Moderator: Mary Way Bolt, Cecil College	<i>Employers discuss the skills, knowledge, and abilities that help employees succeed in additive manufacturing industry. All are welcome to stay for lunch. There is a small nominal fee.</i>

Mike Adelstein, Potomac Photonics

Mike Adelstein has set Potomac Photonics on a course for leading the next industrial revolution by developing and implementing advanced micro manufacturing technologies. Utilizing a broad range of tools including lasers, micro-CNC, 3D Printing and more, Potomac can fabricate features as small as one-micron. He has entered partnerships with leading medical, biotech, consumer goods, and automotive companies.

Josh Barnes Harbor Designs

Josh Barnes is a Baltimore native who has spent over 15 years devoted to streamlining the product engineering and contract manufacturing process. He co-founded Harbor Designs and Manufacturing in 2008 after identifying the need for high quality, cost effective, engineering and manufacturing services. Harbor is an ISO 9001 and ISO 13485 certified Contract Manufacturer with a 45,000 sq ft facility in the heart of a Baltimore City Economic Empowerment Zone.

Brad Ruprecht, Edgewood Chemical Biological Center

Brad Ruprecht serves as a Model Maker for the Edgewood Chemical Biological Center Prototype Integration Facility. He holds a B.S. from Bemidji State University, Bemidji, Minnesota, where he studied Design Technology and Model Making. Ruprecht is adjunct faculty at Towson, teaching for the Interdisciplinary Object Design program.

Greg Paulsen, Xometry

Greg Paulsen leads the Project Engineering team, which acts as the primary interface for project management, services, and support. Paulsen's background is in complex rapid prototyping projects, focusing on the various applications of industrial 3D printing. Prior to Xometry, Greg served as a Graduate Assistant at James Madison University's Product Realization Lab and as a Project Engineer at Prototype Productions, Inc.

Ken Malone, Early Charm Ventures LLC

Ken Malone built his career on creating economic value from science by developing new business lines for global corporations, spinning out new ventures from universities, and commercializing hundreds of new products in advanced materials and life sciences. In 2005, Malone founded Early Charm Ventures, LLC to address the need for creative and flexible business structures to convert science into economic value during its earliest stages. Through Early Charm, Malone supports over a dozen early stage ventures.

Elisa Arch, University of Delaware

Elisa Arch is a Research Assistant Professor at the University of Delaware in the Department of Kinesiology and Applied Physiology. Arch received her B.S. in Biomedical Engineering from the University of Virginia and Ph.D. in Mechanical Engineering from the University of Delaware. Arch's areas of expertise include biomechanics and human movement, prosthetics and orthotics and rehabilitation engineering. She employs additive manufacturing to rapidly and objectively manufacture highly personalized prosthetic and orthotic devices.

Stephen Fisher, Chesapeake Employers Insurance

Stephen Fisher is the Medical Advisor to the CEO at Chesapeake Employers Insurance, the largest workers

compensation insurer in the state of Maryland. Fisher has an M.D., Ph.D. degree with a Ph.D. in pathology focused on interaction of immune factors with the brain. He completed a residency in orthopedic surgery and a fellowship in hand surgery. He received extensive experience caring for patients with workers compensation claims from both private practice and hospital employed practice positions.

Eric Wetzel U.S. Army Research Lab

Eric Wetzel is the team leader for Multifunctional Materials, and Research Area Leader for Soldier Materials, at the U.S. Army Research Laboratory in Aberdeen, MD. His research interests include ballistic textiles, multifunctional composite materials, bio-inspired materials and systems, and power and energy materials. Wetzel has co-authored over 50 peer-reviewed journal publications and book chapters, 60 conference proceedings articles, and holds 13 patents.

Martha Connolly, University of Maryland

Martha Connolly is the director of BioEntrepreneurship at the Maryland Technology Enterprise Institute at the University of Maryland. Connolly is an adjunct faculty member in the Bioengineering graduate program at the A. James Clark School of Engineering, a bioengineering capstone mentor, and teaches a course in entrepreneurship in the life sciences for undergraduates. Connolly holds BS and MS degrees in Chemistry and a Ph.D. in Biomedical Engineering.

Warren Grayson, Johns Hopkins Grayson Lab for Tissue Engineering

Warren L. Grayson is an assistant professor of biomedical engineering at Johns Hopkins University School of Medicine. His research examines the underlying mechanisms that regulate tissue development and helps engineer complex functional tissue constructs for use in regenerative medicine. Grayson is the director of the Johns Hopkins Laboratory for Craniofacial and Orthopaedic Tissue Engineering. He earned his Ph.D. in biomedical engineering and holds a B.Sc. in chemical and process engineering.

Michael Raphael, Direct Dimensions

Michael Raphael founded Direct Dimensions, Inc. in 1995 to provide a "one-stop shop" for 3D technical services, product representation, sales, and support for 3D scanning, imaging, and measurement solutions. Raphael graduated from Virginia Tech with B.S. degree in Engineering Science and Mechanics, and a Master of Engineering Administration from George Washington University.

Chad Schneider, Root3 Labs

Chad Schneider, P.E., MSE, is a professional mechanical engineer with over 15 years of experience in the process of product development. He enjoys designing practical, efficient, and robust electro-mechanical systems and offers extensive knowledge of various rapid prototyping and manufacturing techniques. He is motivated by the challenge of taking on new and difficult projects. Schneider founded Root3 Labs in 2012. Root3 Labs designs and develops technology products for clients as well as internal ventures.