Regional Additive Manufacturing Symposium

August 21, 2024 Rowan University – Glassboro, New Jersey







ADVANCED MATERIALS & MANUFACTURING INSTITUTE Welcome to the 2024 Regional Additive Manufacturing Symposium!

The SAMPE New Jersey Chapter (NJ SAMPE) is excited to be back here at Rowan University to provide a forum for local researchers, educators, and end-users to discuss advancements and challenges in the field of additive manufacturing.

Today's technical program includes speakers from universities across New Jersey, New York, Maryland, and Delaware, as well as industry representation from VRC Metal Systems and Eaton. Four featured speakers will also participate in an expert panel to share their views on "New Trends in Additive Manufacturing."

Additionally, the Symposium Committee has reprised our Student Poster Contest. Take some time to speak with these students about their research. This is the generation that will see the adaptation of additive manufacturing as a core manufacturing technology, rather than simply a hobby or prototyping exercise.

NJ SAMPE is grateful for the support of our co-hosts, the Henry M. Rowan College of Engineering and Rowan University Advanced Materials & Manufacturing Institute (AMMI). We also appreciate our generous corporate sponsors and exhibitors - Chemglass, Eaton, Hauschild, Kaneka, Shimadzu, TA Instruments, and VRC Metal Systems. We encourage you to engage with each of these organizations and explore how their products and services can further your endeavors.

Thank you for your support of NJ SAMPE and the SAMPE North America Additive Manufacturing Center of Excellence by attending this event. We hope you find inspiration in the day's activities.

Sincerely,

Melissa Jaime

Melissa Jaime Benjamin M. Rasmussen Chair, NJ SAMPE



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EVENT SCHEDULE

Registration in Rowan Hall Atrium	8:00 - 9:00 AM
Continental Breakfast sponsored by Kane	ka North America
Exhibits & Posters in Atrium	8:00 - 5:00 PM
Move to Auditorium	
Welcome & Introduction	9:00 - 9:15 AM
<i>Joe Abrantes - Vice Chair, NJ SAMPE</i> <i>Joe Stanzione, III - Founding Director,</i>	Rowan AMMI
Morning Session	9:15 - 11:20 AM
Poster Review & Judging in Atrium	11:30 - 1:00 PM
Lunch in Atrium	12:00 - 1:30 PM
Return to Auditorium	
Student Poster Awards	1:30 - 1:40 PM
Guest Address from SAMPE CTO	1:40 - 1:50 PM
Raj Manchanda, FASME - CTO, SAMPE	North America
Panel Session	1:50 - 2:45 PM
New Trends in Additive Manufacturing: Materials, Methods, and Applications	
Afternoon Session	2:45 - 5:25 PM
Closing Remarks	5:25 - 5:30 PM

VENUE INFORMATION

ROWAN HALL

FIRST FLOOR





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PANEL SESSION

Rowan Hall Auditorium

1:50 - 2:45 PM

New Trends in Additive Manufacturing: Materials, Methods, and Applications



Behrad Koohbor, Ph.D. Rowan University

Assistant Professor of Mechanical Engineering



Aaron Nardi VRC Metal Systems Chief Technology Officer



Jonathan Singer, Ph.D. *Rutgers University Mary W. Raisler Distinguished*

Teaching Chair of Mechanical Eng.



Shahab Zekriardehani, Ph.D.

Eaton

Technology Manager, Polymer and Nanocomposites Team

MORNING SESSION

Rowan Hall Auditorium 9:15 - 11:20 AM

1 Cold Spray Deposition: Process Physics and Applications

Aaron Nardi - VRC Metal Systems LLC

2 Recycling of Polylactic Acid Fused Filament Fabrication (FFF) Filament and the Effects on its Material Properties

Emma Benkovic - Rowan University

3 Quasi-Static Crushing Behavior of Additive Manufactured Honeycomb Structures with Buckling Initiators

Norman M. Wereley, Ph.D. - University of Maryland

4 Electroplating a 3D-Printed Preform to Improve Energy Absorption

Colleen Murray - University of Maryland

5 Additive Manufacturing of TPU-MWCNT Composite Tunable Electro-Mechanical Properties for Large Strain Sensing

Behrad Koohbor, Ph.D. - Rowan University AMMI

Notes:

AFTERNOON SESSION

Rowan Hall Auditorium 2:45 - 5:25 PM 1 Charge Landscape Manipulation for Self-Limiting **Electrospray Postprocessing of Additive** Manufacturing Jonathan Singer – Rutgers University Machine Learning based Grain Boundary 2 **Identification and Segmentation of 3D Printed Metals** Melanie Heider – University of Delaware 3 Prediction of Strain Rate Sensitivity on Viscoelastic Hydrogel Through Time Temperature Superposition of Dynamic Mechanical Analysis Data Caleb Beckwith - New York University 4 **Dual Subaguatic Vortex Generation through Field Multiplexing and 3D-printed Acoustic Lens** Chadi Ellouzi – Rowan University

5 Predictive Modeling for Quality Control in Metal Fused Filament Fabrication

Tyler D. Paupst – Rowan University

6 3D Printing of High-Performance Nanocomposite for Industrial Applications

Shahab Zekriardehani - Eaton

Notes:

STUDENT SPONSORS

These two companies generously supported our program by sponsoring 15 student registrations, 3D-printed keychains for poster session participants, and poster contest prizes.



Kaneka North America LLC is a subsidiary of the Kaneka Corporation, headquartered in Osaka and Tokyo, Japan.

Kaneka Corporation has business activities that span a broad spectrum of markets ranging from plastics, resins, chemicals and foodstuffs to pharmaceuticals, medical devices, electric and electronic materials and synthetic fibers. They supply intermediates for the manufacturing of products in a variety of industries, including the environmental and energy, automotive, construction, information and telecommunication sectors.

Kane Ace[®] MX is Kaneka's novel core-shell rubber (CSR) toughening system for thermoset resins. It is a predispersed CSR Masterbatch which enhances the physical properties of the resins through optimal dispersion of core-shell particles. The revolutionary liquid impact modifiers of Kane Ace[®] MX achieve highly improved strength, improved fracture toughness and endurance without losing the heat resistant characteristics (T_q) of thermoset resins.



Eaton Corporation is a leading multinational power management company. Founded in 1911 in the United States and now incorporated in Dublin, Ireland, Eaton operates globally with a primary administrative center in Beachwood, Ohio. The company employs over 85,000 people and serves customers in more than 175 countries.

Eaton's mission is to improve the quality of life and the environment through innovative power management technologies and services. Their diverse portfolio includes electrical, hydraulic, and mechanical power solutions, making them a key player in sectors such as aerospace, vehicle, and eMobility.

POSTER SESSION

Rowan Hall Atrium

11:30 - 1:00 PM

Optimizing Cold Spray Parameters for Enhanced Polymer Deposition: A Comprehensive Study on PVAs and Nylon 6

Okikiola Agbabiaka & Vance Moran – Rowan University

Optimization and Characterization of Soft Composite 3D-printed Pneumatic Artificial Muscles

Christopher Clark - University of Maryland

Response Analysis of Additively Manufactured Metamaterials: Thermal and Dynamic Experimentation Design

Matthew Heras – Rowan University

Exploring a "Universal Dip" for Electrospray Applications

Hannah Mow - Rutgers University

Void Distribution Influences Poisson's Ratio in Flexible Additive Manufactured Solids: A Computational Study

Nicholas Pagliocca - Rowan University

Investigating a Transfer Learning Approach for Predicting the Quality of Fused Filament Fabrication Parts

Tyler D. Paupst – Rowan University

Mixed-Material Feedstocks for Cold Spray Additive Manufacturing of Polymer-Metal Composites

Matthew S. Schwenger & Madison S. Kaminskyj - Rowan University

Analyzing Bond Strength of Polymer Substrate Metallization by Cold Spray through Single Particle Impact Simulations

Saidur Shoaib - Rowan University

Variable Stiffness 3D Printed Structured Fabrics Activated by a Pressure Field

Jack Szyprowski - University of Maryland

Event Committee

Joe Abrantes Megan Casey, Ph.D. Joe Geiger Amir Islam, Ph.D. Melissa Jaime Howard Kliger, FSAMPE Behrad Koohbor, Ph.D. Jaclyn McLaughlin Borys Schafran Joe Stanzione, III, Ph.D. Shahab Zekriardehani

The committee sends thanks to Jessica Rudolph and Justin Elko of the Henry M. Rowan College of Engineering for their support in making this event a success.

EXHIBITING SPONSORS



MANUFACTURING INSTITUTE

The Advanced Materials & Manufacturing Institute (AMMI) focuses on advancing fundamental and applied science and engineering technology related to materials and manufacturing with the vision to responsibly utilize nature's chemistries to enhance material performance and improve global sustainability.

They partner with industry leaders, government agencies, non-profits, other universities, and community colleges to address challenges in education, food & water, energy, national security, and sustainability at national and local levels.



New Jersey based and family-owned Chemglass, Inc. was originally founded by skilled glassblower Walter P. Surdam in 1946. Recently re-branded as Chemglass Life Sciences, their products continue to be an integral part of chemistry performed in laboratories throughout the world.

In addition to their traditional scientific and chemistry products, the Chemglass product portfolio now includes a complete line of chromatography vials/closures and cell/tissue culture products.



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EXHIBITING SPONSORS

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Their array of fast, accurate, rugged, and reliable instruments can be used for a wide variety of applications, including static, fatigue, and impact tests; internal and fracture observations; thermal analysis, elemental composition analysis; viscosity measurements; and degradation evaluations.



TA Instruments-Waters LLC is a world-leader in instrumentation for thermal analysis, rheology, microcalorimetry, and mechanical testing.

Their instruments contribute to leading discoveries in material science, medicine, and other areas of scientific innovation. TA Instruments is proud to provide highly reliable products and a high level of support to meet the needs of their customers in the evaluation of physical properties.



VRC Metal Systems LLC specializes in advanced manufacturing equipment, parts processing, service, and facility operations. Their core technology is a process known as Cold Spray Deposition, where micron sized powder particles are accelerated with a gas through a supersonic nozzle, resulting in ballistic impact and consolidation of materials for coatings, repair, and additive manufacturing.

VRC also works with other advanced manufacturing techniques, including Wire-DED, Friction Stir Welding, and additive manufacturing, as well as hybrid processing combining these techniques together with cold spray to advance the state of the art in manufacturing.



The Society for the Advancement of Material and Process Engineering (SAMPE) is the only technical society encompassing all fields of endeavor in materials and processes.

Established in 1977, the New Jersey Chapter of SAMPE serves members in NJ, NY, PA, and CT. The chapter was designated as SAMPE North America's first Center of Excellence in Additive Manufacturing in 2018.

Visit njsampe.org and follow SAMPE NJ Chapter on LinkedIn.