



Carbon Hub Annual Meeting May 2

Venue: Anderson-Clarke Center – Glasscock School, Rice University

7:00 – 8:15 am **Check-in & refreshments**

8:15 – 8:45 am **Welcoming Remarks**

- Event Emcee – Marie Contou-Carrere, Executive Director, Carbon Hub – Rice University
- Reginald DesRoches, President – Rice University
- Matteo Pasquali, Director, Carbon Hub – Rice University

8:45 – 9:25 am **The Carbon Hub as a Strategic Partner**

- Essam Al-Sayed, Chief Technologist of Nonmetallic Applications Development – Saudi Aramco
- Ed Ganja, Vice President of Catalyst and Analytical Technology – Shell
- Bob Maughon, Executive Vice President, Sustainability, Technology & Innovation; Chief Technology and Sustainability Officer – SABIC
- Luca de Rai, R&D VP Energy & Innovation – Prysmian Group
- Ramamoorthy Ramesh, Vice President for Research – Rice University
- *Moderator: Scott Nyquist, Senior Director Emeritus – McKinsey & Company*

9:25 – 10:05 am **The Big Science Questions**

- Adam Boies, Professor of Nanomaterials and Aerosol Engineering – University of Cambridge
- Leonardo Spanu, Principal Scientist – Shell
- Juan Vilatela, Head of Multifunctional Nanocomposites Group – IMDEA Materials Institute
- Geoff Wehmeyer, Assistant Professor, Mechanical Engineering – Rice University
- *Moderator: Matteo Pasquali, Director, Carbon Hub – Rice University*

10:05 – 10:35 am **BREAK**

10:35 – 11:15 am **The CNT Innovation Ecosystem**

- John Fraser, Director Strategic Marketing – Huntsman Advanced Materials
- Bryan Hassin, CEO – DexMat
- Amy Heintz, Technical Fellow – Battelle
- Don Parris, Innovation Manager – Prysmian Group
- *Moderator: Marie Contou-Carrere, Executive Director, Carbon Hub – Rice University*

11:15 – 11:45 am **Carbon Hub Update**

- Marie Contou-Carrere, Executive Director, Carbon Hub – Rice University
- Matteo Pasquali, Director, Carbon Hub – Rice University

11:45 – 1:00 pm **LUNCH**



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Venue: Anderson-Clarke Center – Glasscock School, Rice University

1:00 – 3:00 pm Technical Updates by Carbon Hub Academic Collaborators

Room 107 *Session Chair: Matteo Maestri, Prof. of Chemical Engineering – Politecnico di Milano*

Topic 1: VACs Synthesis

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- 1:00 pm **Adam Boies**, Prof. in Nanomaterials and Aerosol Engineering – University of Cambridge
1:30 pm **Seung Min Kim**, Principal Research Scientist, Institute of Advanced Composite Materials – KIST
2:00 pm **Matteo Maestri**, Prof. of Chemical Engineering – Politecnico di Milano
2:30 pm **Eric McFarland**, Prof. of Chemical Engineering – University of CA, Santa Barbara
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Room 108 *Session Chair: Juan Vilatela, Head of Multifunctional Nanocomposites Group – IMDEA Materials Institute*

Topic 5: Structural Applications

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- 1:00 pm **Maksud Rahman**, Ass. Prof. Materials Science & NanoEngineering – Rice University
1:30 pm **Juan Vilatela**, Head of Multifunctional Nanocomposites Group – IMDEA Materials Institute
2:00 pm **Juan Castellon**, Ass. Prof. of Architecture – Rice University
2:30 pm **Mark Goulthorpe**, Founder – DECOi inc.; Assoc. Prof. of Architecture – MIT
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3:00– 3:30 pm BREAK

3:30 – 5:00 pm Technical Updates by Carbon Hub Academic Collaborators

Room 107 *Session Chair: Geoffrey Wehmeyer, Ass. Prof. of Mechanical Engineering – Rice University*

Topic 1: Synthesis & Topic 3: CNTf Power Cables

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- 3:30 pm **David Gailus**, Vice President Engineering – Nanocomp Technologies (Huntsman)
4:00 pm **Geoffrey Wehmeyer**, Ass. Prof. of Mechanical Engineering – Rice University
4:30 pm **Doug Natelson**, Prof. of Physics & Astronomy – Rice University
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Room 108 *Session Chair: Dan Cohan, Assoc. Prof. of Civil and Environmental Engineering – Rice University*

Topic 4: Soil Amendment & Topic 2: HSE

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- 3:30 pm **Dan Cohan**, Assoc. Prof. of Civil and Environmental Engineering – Rice University
4:00 pm **Dan Heller**, Bristol-Myers Squibb / James D. Robison III Junior Faculty Chair – Memorial Sloan Kettering Cancer Center
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5:00 – 6:00 pm Students Posters Session

6:30 – 8:00 pm Networking Dinner (Hungry's, 2356 Rice Boulevard)



Carbon Hub Annual Meeting May 3

Venue: Kraft Hall, Rice University

8:30 – 9:00 am **Check-in & refreshments**

9:00 – 9:15 am **Welcoming Remarks**

- Event Emcee – Marie Contou-Carrere, Executive Director, Carbon Hub – Rice University
- Matteo Pasquali, Director, Carbon Hub – Rice University

9:15 – 10:15 am **Managing the growing hype on CNTs**

Awareness of the potential of CNT materials to contribute significantly to solving climate change is mounting. In the past 12-18 months, interest from VCs investing in methane pyrolysis, carbon materials, CNTs, graphene, etc, has escalated. There are similarities with the early 2000s hype, which led to misallocation of resources and the bust cycle in the late 2000s and 2010s.

Nomenclature is part of the problem. Only a very narrow subset of nanoscale carbon can provide solutions to climate change. At best, the majority of nanoscale carbons can provide specific specialty material solutions to niche applications. Many of these processes, e.g., conversion of CO₂ to nanoscale carbon, cannot go to scale. Nor can they deliver on the high structural, electrical or thermal performance that is possible. In an efficient resource allocation strategy, only materials that can have impact at scale should attract ESG investments and initial government subsidies. Likewise, the EH&S profile of these materials is vastly different; by now, there is compelling evidence that EH&S concerns can be managed in the production and application of the “right” nanoscale carbons. Yet, we do not have names to distinguish the nanoscale carbon that has true potential for addressing climate at scale vs. the larger families (in fact, writing this paragraph was very awkward). Moreover, the scientific base for assessing the potential of nanoscale carbon is confined to a small number of academic and government labs, which are not broadly accessible to corporations and investors navigating their entrance in the field.

How can we address these challenges? Should we develop a nomenclature that distinguishes nanoscale carbon that can form macroscopic structures from the rest of the class, which can only be used as additives? Should we organize a “testing group” that would receive samples from producers and funders, and would provide assessments on whether the samples belong to the desirable subgroup? How could we organize such an effort so that additional pyrolytic carbon materials can be added and graded as they are proven in scalable applications?

- *Facilitator: Amy Heintz, Technical Fellow – Battelle*
- Mark Banash, President & Chief Scientist – Neotericon
- Jeff Blackburn, Group Research Manager III Materials Science– NREL
- Jeff Fagan, Project Leader Particles, Tubes and Colloids Project – NIST
- Benji Maruyama, Autonomous Research Lead, Materials & Manufacturing Directorate – AFRL

10:15 – 10:45 am **BREAK**



Carbon Hub Annual Meeting May 3

Venue: Kraft Hall, Rice University

10:45 – 11:15 am Piercing the metals market with CNT products

Discussion on the major issues and challenges affecting minerals/metals supply, demand and price. A variety of policy mandates and regulatory actions intended to force fossil fuels out of the picture are inducing “hype” in the mining and minerals businesses. A variety of constraints exist including: trends in metallic and non-metallic minerals yields and quality; policy/regulatory pressures that affect project cycle times and costs; minerals geopolitics; and other factors. These constraints contribute to supply chain fragility. Only a narrow band of minerals and metals can meet “responsible sourcing” targets. Our key focus is on how these conditions are creating opportunities for substitutes and innovative strategies, along with new barriers and impediments to materials advances. At the same time, CNT fibers and macroscopic materials have proven properties that overlap with metals such as copper, aluminum, and steel. This property overlap presents opportunities for material substitution.

- Michelle Foss, Fellow in Energy, Minerals and Materials, Center for Energy Studies, Baker Institute– Rice University
- Matteo Pasquali, Director, Carbon Hub – Rice University

11:15 – 11:45 am CNTs policy considerations

This session will discuss how current policies affect CNTs across life cycles, from R&D, sourcing, primary and secondary manufacturing, use and end-of-life. Issues will cover CNTs and the Inflation Reduction Act; CNTs under a circular carbon economy model; environment, health and safety policies of CNT; and other issues that could challenge the advancement of CNTs, e.g. NIMBY-ism, environmental justice, EPA pyrolysis regulations, global bans on CNTs, etc.

- Rachel Meidl, Fellow in Energy and Environment, Center for Energy Studies, Baker Institute– Rice University

11:45am – 1:00 pm LUNCH



Carbon Hub Annual Meeting May 3

Venue: Kraft Hall, Rice University

1:00 – 2:30 pm The customer perspective (Roundtable)

The goal for the roundtable is to lay out key considerations from the customer perspective, ranging from materials performance to responsible sourcing and supply chain resilience / reliability. This discussion will enhance the Carbon Hub supported research on competitiveness of CNT materials and products.

- *Facilitator:* Michelle Foss, Fellow in Energy, Minerals and Materials, Center for Energy Studies, Baker Institute– Rice University
- Dhaval Shah, General Manager for Corporate Technology & Innovation – SABIC
- Don Parris, Innovation Manager – Prysmian Group
- Mark Goulthorpe, Founder – DECOi inc.; Assoc. Prof. of Architecture – MIT

2:30 – 3:00 pm Summary and Forward Actions

- Matteo Pasquali, Director, Carbon Hub – Rice University

3:00 pm END OF THE ANNUAL MEETING