The National Academies of SCIENCES · ENGINEERING · MEDICINE

MEETING OF THE BOARD ON CHEMICAL SCIENCES AND TECHNOLOGY

Virtual Meeting

Tuesday, October 19, 2021 **OPEN SESSION**

Zoom Information:

URL: https://nasem.zoom.us/j/92268930748?pwd=K0wxUkx6WHpmL3I3cnJXNU1LNmV3UT09

Dial in #: +1 470 250 9358 Meeting ID: 922 6893 0748 Password: 996819

1:30 PM Welcome and Meeting Overview

Jennifer Sinclair Curtis University of California, Davis

Scott Collick **DuPont**

Session I: Preparing the American Chemical Enterprise for Disruption 1:35 PM BCST Facilitator: Gerard Baillely, The Procter & Gamble Company BCST Staff: Linda Nhon, Associate Program Officer

Major societal, economic, and environmental shifts (e.g., sustainability, medicine, renewable energy, clean water, general public trust in chemistry, etc.) in the 21st century present the chemical industry with numerous challenges. In addition, today's technological and scientific advancements in computational science, molecular engineering, measurements (analytical or sensor-based), and life science have revolutionized the way problems are approached and the "lab-to-market" innovation cycle. Together, these disrupt the traditional chemical innovation ecosystem and require the U.S. chemical enterprise to respond with urgency to take advantage of these disruptions or risk losing a competitive edge in the global market, such as deterring STEM talents to the chemistry field. The goal of this session is to survey the current state of innovation in the chemical industry and its preparedness to confront disruptions and turn them into value creation and competitive advantage. High-priority areas that require new mindsets, partnerships, resources, and support will also be discussed.

1:40 PM Pioneering Innovations: Opportunities and Challenges Ignacio Martinez

Flagship Pioneering

Jess Leber Ginkgo Bioworks

Anthony M. Boccanfuso UIDP

2:40 PM Questions and Discussion

3:00 PM Adjourn

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Wednesday, October 20, 2021 OPEN SESSION

Zoom Information:

URL: https://nasem.zoom.us/j/91453128939?pwd=NHdVZms2Q3dIMlp3UXZTS0Jia09Ddz09

Dial in #: +1 646 518 9805 Meeting ID: 914 5312 8939 Password: 318095

10:00 AM Welcome and Meeting Overview

Jennifer Sinclair Curtis University of California, Davis

> Scott Collick DuPont

10:05 AM Session II: Life Cycle Assessments-Where We Draw the Box BCST Facilitators: Vijay Swarup, *ExxonMobil* and Scott Collick, *DuPont* BCST Staff: Liana Vaccari, Program Officer

Life Cycle Assessments (LCA) are a widely but inconsistently used tool to account for the carbon footprint of a product or process. A major source of variation between applications of LCA comes from the choice of boundary of the assessment (e.g. cradle-to-gate or cradle-to-grave). Consistent standards for drawing this box will contribute to a more accurate and effective accounting of greenhouse gas emissions. This session will frame a discussion around an example of decision-making when performing an LCA and why it is important along product value chains or full energy pathways.

10:10 AMDelivering Life Cycle Assessments and Data to
the Market PlaceFrancis Fetizanan
DuPont Mobility & Materials

- 10:55 AM Making Better Decisions for the Energy Robert Armstrong Transition Massachusetts Institute of Technology **Discussion of Potential BCST Activity** 11:40 AM 12:15 PM Break Session III: Sustainability and Security in Battery Technology 1:45 PM BCST Facilitators: Jodie Lutkenhaus, Texas A&M University; Amy Prieto, Colorado State University BCST Staff: Megan Harries, Program Officer With the projected growth of electric vehicles, there is an urgent need to address energy security and sustainability from a battery perspective. For example, cobalt is an element currently used in the manufacturing of Li-ion batteries, but cobalt supply and distribution may not keep pace with demand in the coming decades. Research innovation to create new battery chemistries and designs, involving more sustainable materials, may address such needs from the manufacturing side; meanwhile, improving technologies for recycling and materials recovery is a parallel effort that also reduces waste. This session discusses near-, mid-, and long-term opportunities for the chemical sciences to advance battery technology. 1:50 PM Conversion Electrode Chemistry as the Future Gleb Yushin of Li-Ion Batteries *Georgia Institute of Technology* 2:40 PM Lithium Metal and Solid-State Batteries: Y. Shirley Meng **Opportunities and Challenges** University of California, San Diego 3:20 PM **Discussion of Potential BCST Activity**
- 4:00 PM Adjourn