GREG WALDEN, OREGON
CHAIRMAN

FRANK PALLONE, JR., NEW JERSEY
RANKING MEMBER

ONE HUNDRED FIFTEENTH CONGRESS

Congress of the United States
House of Representatives

COMMITTEE ON ENERGY AND COMMERCE
2125 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515-6115

Majority (202) 225-2927
Minority (202) 225-3641

MEMORANDUM

March 13, 2017

To: Subcommittee on Digital Commerce and Consumer Protection Democratic Members and Staff

Fr: Committee on Energy and Commerce Democratic Staff

Re: Hearing on "Disrupter Series: Advanced Materials and Production"

On **Wednesday, March 15, 2017, at 10:15 a.m. in room 2322 of the Rayburn House Office Building**, the Subcommittee on Digital Commerce and Consumer Protection will hold a hearing titled "Disrupter Series: Advanced Materials and Production."

I. BACKGROUND

Advanced materials have mechanical or physical behavior characteristics that permit them to have superior performance when compared to conventional materials.[1] Examples of such materials include a metal foam that can stop bullets and an aluminum-steel alloy that is flexible, lightweight, and as strong as titanium.[2] Advanced materials can be found across many industry sectors including automotive, aerospace, energy, and electronics.[3]

Some advanced materials, such as graphene (a two-dimensional sheet of carbon atoms with many unusual properties), are discovered accidentally.[4] Others are created for use with new

[1] Center for Economic Growth and the Lally School of Management at Rensselaer, *Advanced Materials Sector Report* (2004).

[2] *Researchers Have Invented a New Type of Metal that Pulverizes Bullets*, Quartz (Apr. 20, 2016); *Scientists Invent a New Steel as Strong as Titanium*, Popular Mechanics (Feb. 4, 2015).

[3] *Advance Materials Market Estimated to Reach US$ 102.48Bn by 2024; Global Industry Analysis, Size, Share, Growth, Trends, and Forecast 2016-2024 –Transparency Market Research*, PR Newswire (Dec. 23, 2016).

[4] *Material Question*, New Yorker (Dec. 22, 2014).

manufacturing technologies such as 3D printing.[5] New techniques are also developed to achieve specific objectives; significant research on advanced forms of steel, aluminum, plastics, and other composites has been conducted with the goal of making automobiles more lightweight to improve fuel efficiency and meet consumer demands.[6]

High-tech manufacturing is highly productive and supports 39 million jobs nationwide in the Science, Technology, Engineering and Math (STEM), industrial, and service sectors.[7] Full-scale commercial production, however, does not typically begin until ten to twenty years after initial discoveries are made.[8] Experts have suggested that more sophisticated manufacturing processes, as well as a system to address any unforeseen environmental, health, and safety hazards linked to new materials, will be necessary to shorten this timeline.[9] In addition, recent innovations in computer-aided modeling and data science may be able to accelerate the development of advanced materials and reduce their cost.[10]

II. FEDERAL GOVERNMENT ROLE

Support for advanced materials research and commercialization comes from multiple federal agencies, including the Department of Commerce, Department of Energy, Department of Defense, National Science Foundation, National Institutes of Health, and NASA.[11] The Materials Genome Initiative, established by President Barack Obama in 2011, has invested more than $500 million in federal funding to discover and deploy advanced materials.[12] Since 2000, President Bill Clinton's National Nanotechnology Initiative has coordinated agency efforts to expand nanoscale science in the U.S.[13]

---

[5] Memorandum from Democratic Staff to Democratic Members of the House Committee on Energy and Commerce, Subcommittee on Commerce, Manufacturing, and Trade, Hearing on "Disrupter Series: 3D Printing" (Feb. 24, 2016).

[6] *Steel Industry Feeling Stress as Automakers Turn to Aluminum*, New York Times (Feb. 24, 2014); National Highway Traffic Safety Administration, *Investigation of Opportunities for Lightweight Vehicles Using Advanced Plastics and Composites* (Dec. 2012) (DOT HS 811 692).

[7] Brookings Institution, *America's Advanced Industries: New Trends* (Aug. 4, 2016).

[8] National Science and Technology Council, Subcommittee for Advanced Manufacturing, *Advanced Manufacturing: A Snapshot of Priority Technology Areas across the Federal Government* (Apr. 2016).

[9] *Id.*

[10] *Id.*

[11] *Id.*

[12] Materials Genome Initiative, *The First Five Years of the Materials Genome Initiative: Accomplishments and Technical Highlights* (Aug. 2, 2016) (www.mgi.gov/sites/default/files/documents/mgi-accomplishments-at-5-years-august-2016.pdf).

[13] Memorandum from Democratic Staff to Democratic Members of the House Committee on Energy and Commerce, Subcommittee on Commerce, Manufacturing, and Trade, Hearing on "Nanotechnology: Understanding How Small Solutions Drive Big Innovation" (Jul. 29, 2014).

President Obama also established the National Network for Manufacturing Innovation (NNMI), a network of nine federally supported advanced manufacturing research institutes throughout the country.[14] NNMI institutes include the National Additive Manufacturing Innovation Institute in Ohio, Lightweight Innovations for Tomorrow in Michigan, the Institute for Advanced Composites Manufacturing Innovation in Tennessee, and Advanced Functional Fabrics of America in Massachusetts.[15]

III. WITNESSES

The following witnesses have been invited to testify:

Afsaneh Rabiei, Ph.D.
Professor, Department of Mechanical and Aerospace Engineering
North Carolina State University

James Tour, Ph.D.
T. T. and W. F. Chao Professor of Chemistry, Professor of Computer Science, Professor of Materials Science and NanoEngineering
Rice University

Keith Murphy
Chairman and CEO
Organovo

Shane Weyant
President and CEO
Creative Pultrusions

Hota GangaRao, Ph.D.
Maurice A. and Jo Ann Wadsworth Distinguished Professor – Civil and Environmental Engineering
Director, Constructed Facilities Center
Director, Center for Integration of Composites into Infrastructure
West Virginia University

[14] Manufacturing USA, The National Network for Manufacturing Innovation (www.manufacturing.gov/nnmi) (accessed Mar. 9, 2017).

[15] Manufacturing USA, Institutes (www.manufacturing.gov/nnmi-institutes) (accessed Mar. 9, 2017).