materials, an initiative which has since been passed by the House Science Committee. Some of the researchers also discussed the benefits of research in artificial intelligence (AI) relevant especially to materials.

Senator Bob Corker of Tennessee—who serves on the Senate Budget Committee—told his constituent Joshua Caldwell that AI and quantum information issues are "a big deal." However, Corker said, "When the roof falls in [on the US fiscal status], basic and fundamental science will be one of the first wave of cuts." Corker implied that his last major issues before his pending retirement will be this budget appropriations cycle.

Caldwell also found much support for basic research from his representative, Jim Cooper. The congressional representative told Caldwell that while he voted for the budget, he was extremely concerned about long-term funding. Caldwell mentioned that investment in science pays for itself many times over. "Every interest group says that," Cooper said, "but I do agree that science is the only one that can back that comment up with hard data."

World Materials Summit addresses UN Sustainable Development Goals

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Early this summer, the UN released its *Sustainable Development Goals Report 2018* during a press conference in New York. The purpose of the report is to gauge progress in the 17 goals adopted by world leaders to end poverty, fight inequalities, and tackle climate change by 2030. The goals were established in 2015, and last fall, the Sixth World Materials Summit—co-sponsored by the International Union of Materials Research Societies, with participants ranging from researchers to policymakers—focused discussions on this set of goals. The Materials Summit followed with a comprehensive report, *Materials Innovation for the Global Circular Economy and Sustainable Society*.

In separate reports, the UN and the Materials Summit recognize where advances have been made but emphasize that progress needs to be significantly accelerated in order to achieve the goals by 2030. The reports identify where government policies are needed to help.

Since the goals were adopted, the UN report acknowledges bold actions taken by numerous countries to achieve these goals. As policymakers face continuing challenges, the report calls for them to consider how to make societies more resilient: "A good place to start is by establishing robust water and sanitation infrastructure, ensuring access to clean and affordable energy, building safe and ecologically friendly cities, protecting ecosystems, and instituting sustainable consumption and production patterns."

As materials research provides a means to accomplish these goals, the Summit recommended that policymakers consult scientists. In a discussion of disruptive materials for the future, for example, the Summit participants pointed to research funding for nanoalloys and nanomaterials, high-entropy alloys, and advanced composites, as well as for SiN, GaN, and diamond and coatings for power electronics. The participants delineated the benefits of research in additive manufacturing and big data to speed up development.

According to the UN report, access to electricity (covered in Goal #7) has increased in many countries, and the ability to use renewable energy to produce electricity has advanced rapidly; however, progress needs to be fast-tracked in the areas of transportation, heating, and cooling, and that 41% of the world population is still missing access to clean cooking fuels and technologies.

The World Materials Summit, which has traditionally focused on energy, reported on the challenges as well as disruptive materials for the future. The Summit recommends a significant acceleration in deployment of energy storage on the grid, to match the time profiles of variable wind and solar generation to the daily demand profile. The participants concluded that Generation IV nuclear reactors offer a safe and sustainable means of generating energy, and that nanocatalysts and artificial photosynthesis can be developed along many frontiers including some based on bioinspired concepts. For developing communities, the participants see solar as the main viable option.

In transportation, broad electrification of vehicles has been slowed down due to access and costs of the necessary elements, and significant development is needed for hybrid or fuel-cell cars, according to the Summit report. Weight must be reduced whether transportation is for land or air.

Progress toward Goal #3 on health, according to the UN report, is still falling short. While a substantial decrease in mortality rate in childbirth and for children under five is applauded, increases are being seen in various diseases (e.g., malaria) and status has been taken on others (e.g., cardiovascular disease, cancer, diabetes, and chronic respiratory disease). The report particularly pointed out health issues related to the lack of access to clean water.

The Summit, adding to its previous focus on energy and sustainability, explored materials research directions for health, emphasizing the role of nanomaterials and nanotechnology in health diagnosis, monitoring, treatment, and prevention. Participants in a forum of the Summit devoted to next-generation researchers emphasized the future role of big data, data analytics, and machine learning to advance R&D in this field.

The topic of water crossed over into different segments of the Summit. Participants concentrated on the materials and methods needed for further development to purify water effectively and at low cost. Nanomaterials, among other options, plays a role. Water appears in Goal #6 of the UN's sustainability goals.

Both reports, rich in details, can be accessed online. □

We welcome comments and feedback on these articles via email to Bulletin@mrs.org.

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