

Submission Deadline—August 14, 2020



CALL FOR PAPERS

## Advanced Nanomechanical Testing

Small-scale mechanical characterization is essential for ensuring the service performance and lifetime of small components, such as thin films and coatings, electronic sensors, and MEMS. The first mechanical measurements on the submicrometer scale were enabled by the development of nanoindentation in the 1980s. *JMR* has long been the flagship journal for this field. In addition to countless contributed articles, previous Focus Issues published over the past two decades have disseminated the latest in method developments and trends in the field.

In addition to providing a long-expected update, this Focus Issue will expand the scope of nanomechanical testing methods beyond classical nanoindentation. Recent years have seen numerous attempts to access specific materials parameters and to better account for the typical operational conditions of the sample of interest. We therefore welcome contributions related to, but not limited to, focused ion beam (FIB) enabled methods, complex loading conditions, *in situ* testing, and testing in extreme environments. Application of nanomechanical testing methods to new types of materials are also encouraged. This Focus Issue is a unique opportunity to highlight and share recent significant developments and achievements with the greater nanomechanics community.

### Contributing papers are solicited in the following areas:

- ◆ Nanoindentation, micromechanical, and nanomechanical testing
- ◆ New developments, e.g., for the acquisition of the full stress–strain response
- ◆ Application to new types of materials
- ◆ Complex loading conditions (cyclic fatigue, fracture testing)
- ◆ Extreme testing environments (high and low temperatures, irradiation, high strain rates)
- ◆ *In situ* testing (in scanning electron microscope, transmission electron microscope, or synchrotron)

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### MANUSCRIPT SUBMISSION

To be considered for this issue, new and previously unpublished results or review articles significant to the development of this field should be presented. The manuscripts must be submitted via the *JMR* electronic submission system by August 14, 2020. Manuscripts submitted after this deadline will not be considered for the issue due to time constraints on the review process. Please select “*Advanced Nanomechanical Testing*” as the Focus Issue designation. **Note our manuscript submission minimum length of 3250 words, excluding figures, captions, and references, with at least 6 and no more than 10 figures and tables combined. Review articles may be longer but must be pre-approved by proposal to the Guest Editors via [jmr@mrs.org](mailto:jmr@mrs.org). The proposal form and author instructions may be found at [mrs.org/jmr-instructions](https://mrs.org/jmr-instructions).** All manuscripts will be reviewed in a normal but expedited fashion. Papers submitted by the deadline and subsequently accepted will be published in the Focus Issue. Other manuscripts that are acceptable but cannot be included in the issue will be scheduled for publication in a subsequent issue of *JMR*.

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Please direct questions to [jmr@mrs.org](mailto:jmr@mrs.org)



## MRS Government Affairs Committee responds to COVID-19 pandemic

[mrs.org/advocacy-policy](https://mrs.org/advocacy-policy)

The novel coronavirus that causes COVID-19 has upended many of our normal practices and routines in unprecedented ways. However, materials scientists, along with the broader scientific community, have provided varied contributions to mitigate this crisis through incredible creativity and flexibility. The Government Affairs Committee (GAC) of the Materials Research Society (MRS) aims to understand the changes in the legislative policy environment resulting from the pandemic and opportunities for materials science to make a continued impact on this and myriad other societal

challenges. MRS is working hard to make sure that the materials research community is being heard and has input in developing effective government policy for support of materials science during this time. Following is the latest news, reprinted from the Spring 2020 issue of *Intersections*, the quarterly e-newsletter covering MRS advocacy efforts and news from Washington, DC.

- MRS GAC Chair, David P. Norton, highlights the key role advanced materials play in combating COVID-19 and the importance of continued leadership in materials research.

- Congressional Visits Day Subcommittee Chair, Bill Hammetter, discusses preparations for the next Congressional Visits Day, following the cancellation of the spring event.
- Jennifer Nekuda Malik, Chair of the Advocacy Engagement Subcommittee, introduces two materials success stories for education and advocacy efforts. For help with advocacy, GAC asks MRS members to submit examples of how their work has contributed toward the fight against COVID-19.\*

**Jennifer DiStefano,**  
Editor, *Intersections*

## Importance of continued leadership in materials research

by David P. Norton, Chair, MRS Government Affairs Committee

It is amazing how much things changed in a short time. In mid-February, I was in Seattle attending a conference, looking forward to being in Phoenix in April for the 2020 MRS Spring Meeting. Now, we all are embedded in a coronavirus-restrained reality. Our normal days at the office have transformed into nonstop video calls, many by working from home.

Within this construct, the advantages of today's technologies are obvious, and the importance of materials research is evident as well. We have all read accounts of how three-dimensional (3D) printing, a direct product of materials research, has been instrumental in addressing local supply chain issues in the manufacturing of parts for medical testing and personal protection. Our understanding of the structure and interactions of biomolecular surfaces, fundamentally a biomaterials issue, is paramount in the search for vaccines and therapeutics to combat the virus. Whether directly or indirectly, materials research is playing a major role in our current unified struggle.

As we move forward as a society with resolve and determination, it is important that the value of materials research remains visible and at the forefront. As we reengineer our personal and professional lives and prepare to be productive and competitive in tomorrow's reality, leadership in materials research will remain paramount. For example, disruptions in supply chains, both nationally and internationally, continue to challenge our capacity to manufacture and provide critical services as society grapples with challenges imposed by COVID-19. Outside of the current issues, there remains a host of supply chain challenges related to critical materials, such as rare-earth metals, that are important for defense and other technology areas. These needs continue as we strive to improve security and build a more resilient manufacturing base. As we scan the horizon several years out, the residual impacts of the pandemic on economies will likely remain. We must ensure that materials



research continues to thrive for the resiliency of our economy. Most obvious at present is our need to fundamentally understand the behavior and nature of complex biomolecular materials, including viruses. But for a multitude of technologies, including transportation, communication, computation, and others, advances in materials research are key to future competitiveness.

Materials research is now, and will continue to be, vital to our future in developing new technologies that meet the needs of society. As we shift and adjust the cadence of life, the advancements we make today in materials research will dictate our success both present and toward the future.

## Visiting Capitol Hill

by Bill Hammetter, Chair, Congressional Visits Day Subcommittee

First, and most importantly, I hope everyone is healthy and well in these strange times. As we all know, the COVID-19 pandemic has caused the cancellation of many events, including the 2020 MRS Spring Meeting in Phoenix, Ariz. Another “cancellation casualty” was the MRS Spring Congressional Visits Day (CVD) scheduled for late April, in which [US-based] materials researchers meet with their representatives or senators in Washington, DC, to advocate support for materials research funding (see *MRS Bulletin*, doi:10.1557/mrs.2018.189). I was pleased that it was canceled, not only to thwart the spread of COVID-19, but also because the “message” we were planning to deliver to our legislators (along with full color, glossy paper leave-behinds) was not consistent with the current world situation. It would have been hard for our representatives to hear a message about continued, or enhanced, federal support for fundamental

scientific research without highlighting any contribution that scientific research, development, and application could make, or had made toward fighting the current pandemic.

Looking forward to our next opportunity to speak with our legislators, we need to be ready with examples and stories about the contributions that scientific R&D, especially materials-related R&D, have made, and can make, to unforeseen world crises such as the current pandemic. As a community of scientists (educated, critical-thinking, problem solvers) we have special talents (and responsibilities) to adapt our abilities and our “work product” to respond to this and other challenges as they may arise. These are the examples and stories that our representatives need to hear during our next CVD.

I would like to end on a personal note. I cannot think of a time when I have been more proud of being a materials scientist. In the short time that we have been



responding to this pandemic, I have seen research chemists making hand sanitizer for co-workers and others when none was available, I’ve seen researchers with additive-manufacturing skills and equipment making parts for converting common CPAP machines into ventilators, and a group that developed and manufactured an attachment to a ventilator that will purify the breath exhaled by COVID-19 patients. In my opinion, these actions truly give life to MRS’ “motto” of “Advancing materials; improving the quality of life.” Be well.

## Materials success stories for education and advocacy efforts

by Jennifer Nekuda Malik, Chair, Advocacy Engagement Subcommittee

The Advocacy Engagement (AE) Subcommittee of GAC has finalized and printed two materials success stories, the first two in a series, emphasizing the value of materials successes driven by federal research investment. The stories are available for materials researchers to use as they call for continued funding support. The first highlights the myriad uses and resulting benefits of diamond-like carbon across a number of sectors, while the second explores the vast potential of two-dimensional materials. These stories bring to light areas where federal funding has driven materials research, where this research has benefited the economic

health and security of the United States, and where continued federal support still has a significant role to play.

Printed on postcards that provide succinct summaries, bulleted highlights, and relevant visuals, these success stories are part of the education and advocacy efforts of MRS. They will be used during government visits to promote understanding of the impacts of materials research and advocate for strong science budgets. They are also available for members to access on the MRS advocacy website.

In light of the COVID-19 global pandemic, the AE subcommittee is working on materials success stories that



highlight responses based on materials science and technology. The stories will feature materials solutions such as 3D printing of face shields, decontamination of surfaces and personal protective equipment with ultraviolet light-emitting diodes, and materials for filtration to reduce the spread of the virus.

**\* GAC wants to hear from you!** Both the AE and CVD subcommittees want to hear more stories regarding materials-related responses to the pandemic for consideration in its advocacy work. Contact Donna Gillespie at [gillespie@mrs.org](mailto:gillespie@mrs.org) to share your story.