

SIAM Activity Group Mathematical Aspects of Materials Science (MS)

Charter Renewal Application

This Charter Renewal Application applies to the SIAM Activity Group on Mathematical Aspects of Materials Science. The SIAM Activity Group (SIAG/MS) was originally formed under the aegis of SIAM on July 10, 2008 by the SIAM Council and July 12, 2008 by the SIAM Board of Trustees. Its charter has been renewed by the council and board three times thereafter.

This SIAG had 317 members as of December 31, 2018; of these, 137 were students. This reflects about a 20% increase in AG membership from three years ago.

According to the Rules of Procedure it is the purpose of the SIAM Activity Group on Mathematical Aspects of Materials Science to bring together mathematicians, engineers and scientists interested in the application of analysis and computation to problems in materials science. Because of the unifying nature of mathematics, the SIAG will serve as a meeting point for mathematicians, engineers and scientists interested in all areas of materials science, thus fostering cross-fertilization between fields, and from diverse venues such as academia, industry and the national laboratories. In this manner, the SIAG provides a unique opportunity for interaction between fields that would be greatly diminished in its absence.

Within the framework of SIAM, the SIAG will conduct activities that implement its purposes.

The SIAG on Mathematical Aspects of Materials Science is expected to:

1. Organize minisymposia at the SIAM Annual Meeting in years where there is no SIAG conference.
2. At least once every five years either organize a track of at least six minisymposia at the SIAM Annual Meeting or have an activity group meeting held jointly with the annual meeting. The VP for Programs and the VP at Large will coordinate the scheduling with the SIAG chair.
3. Organize the SIAM Conference on Mathematical Aspects of Materials Science series, with conferences taking place every two or three years. The chairs of the conference organizing committee shall be the program director and the chairperson of the SIAG or their designees.

The SIAG/MS has complemented SIAM's activities and supported its proposed functions. The answers to the questions below indicate how this was accomplished and what the officers propose as the future directions for the SIAG/MS.

1. *List all current officers of the activity group:*

- Chair: Kaushik Bhattacharya
- Vice Chair: Jianfeng Lu
- Program Director: Rustum Choksi
- Secretary: Yekaterina Epshteyn

2. *Please list conferences/workshops the activity group has sponsored or co-sponsored over the past three years, and give a brief (one sentence or phrase) indication of the success or problems with each.*

- In 2018, the SIAM Conference on Mathematical Aspects of Materials Science (MS18), was held jointly with AN18 in Portland, Oregon, USA. Of the 1336 attendees, 511 indicated they planned to attend MS18.
- In 2019, the SIAG sponsored a symposium on 'Mathematical aspects of materials science – Modeling, analysis and computations' at the 2019 Spring Meeting of the Materials Research Society. The symposium attracted 72 speakers and was extremely well attended. One issue with this symposium is the high cost of registration for MRS.
- In ICIAM 2019, a number of minisymposia related to Materials Science are being organized by researchers active in SIAG/MS.

3. *Please indicate other activities sponsored by the activity group, to include newsletters, prizes and websites. Have each of these been active and successful?*

There was a very successful and well-attended Women in Mathematics of Materials (WIMM) Networking Luncheon organized by female participants of the MS18. In general, WIMM is actively involved in organizing symposia and workshops for female participants during different scientific events (like at AWM symposia, SIAM conferences, etc.)

4. *What activities are planned and proposed for the next period of the charter? Please describe scheduled and suggested future activities in detail.*

The 2020 SIAM Conference on the Mathematical Aspects of Materials science is planned to be held at BCAM (Basque Centre for Applied Math) during 18-22 May 2020. The conference chairs are Rustum Choksi (McGill and current program director), Govind Menon (Brown and former program director) and Arghir Zarnescu (BCAM and representative from BCAM). The organizing committee has been formed and the 15 invited speakers have been confirmed.

5. *How can SIAM help the activity group achieve its goals?*

- SIAG/MS is very happy with the level of support from SIAM.
- There is a desire expressed at SIAG/MS meeting to institute a SIAG/MS prize to further publicize the work represented by the AG. The officers and particularly the president is actively exploring this possibility. SIAM's help in raising funds for the prize and getting the prize approved would be greatly appreciated.

- Travel funds that SIAM contributed for our minisymposium in the MRS 2019 Spring Meeting were valuable in helping early-career mathematicians and students in this area to attend.

6. *How can the activity group help SIAM in its general role of promoting applied mathematics and computational science?*

- The SIAG/MS is active in recruiting potential authors of SIAM News articles in areas related to materials science. The current issue has an article, “Pentamode Materials: From Underwater Cloaking to Cushioned Sneakers” by Cherkaev et al., and we have spoken to the editors about two more potential authors.
- The SIAG meeting organizers aim to stretch the scope of the community's activities. This is visible in the lists of invited speakers, many of whom are from materials science, physics, and engineering communities and had little previous connection to SIAM. For example, invited speakers of this type at MS18 included Michele Ceriotti, Giulia Galli, Carol Handwerker, William Irvine, Michal Lipson, Nigel Mottram, and Stewart Silling. This is also reflected in the organizing committee and minisymposia. Many choose to join SIAM, and some become directly involved in SIAM's activities.

This SIAG requests that the SIAM Council and Board of Trustees renew an interim charter for a one-year operating period beginning January 1, 2020.

Signed,

Kaushik Bhattacharya, Chair,

SIAM Activity Group on Mathematical Aspects of Materials Science