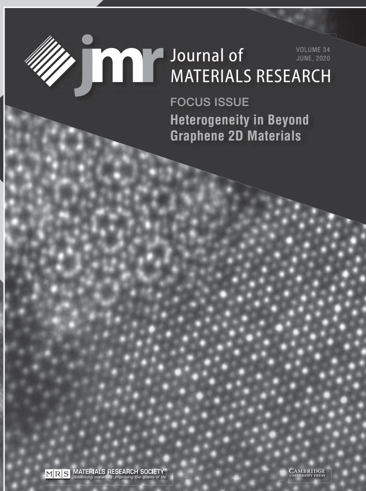
jmr Journal of MATERIALS RESEARCH
FOCUS ISSUE · JUNE 2020

Submission Deadline—November 1, 2019



CALL FOR PAPERS

Heterogeneity in Beyond Graphene 2D Materials

Van der Waals (vdW) layered crystals and two-dimensional (2D) materials have shown remarkable physical and chemical properties, indicating a potentially large impact for future electronics and optoelectronics devices, as well as in quantum information science and energy applications. These atomically thin materials, however, also display remarkable heterogeneities and imperfections. At atomic scales, 2D sheets contain point defects including vacancies, intentional dopants, and impurities. At the mesoscopic level, these imperfections include misoriented grains and layers, mixed phases, strain and charge transfer induced by the substrate, absorbates and the dielectric environment. While these heterogeneities are of manufacturing concern for controllable, uniform, and large area synthesis of these materials, they also present opportunities that could lead to new abilities in tailoring the functionalities of 2D and layered materials for future transformative technologies. To fully reveal these opportunities, a synergistic strategy to fundamentally study these 2D materials must be developed, and new characterization approaches must be found and implemented.

This JMR Focus Issue serves to report the latest advances in the area of 2D and layered materials, with emphasis on fundamentally understanding the role of heterogeneities in these materials and heterostructures on their mesoscopic properties and functionalities, the development of paths to control the formation of these heterogeneities through synthesis and processing, and the emerging properties that can be accessed and used in novel application.

Contributing papers are solicited in the following areas:

- Novel properties emerging from heterogeneity.
- Tailoring specific heterogeneities, such as phase, defect type, dopants, and heterostructures through controlled synthesis and processing
- Advances in the characterization of heterogeneity including spatially- and time-resolved spectroscopy and microscopy.
- Predictive modeling and theoretical simulation.

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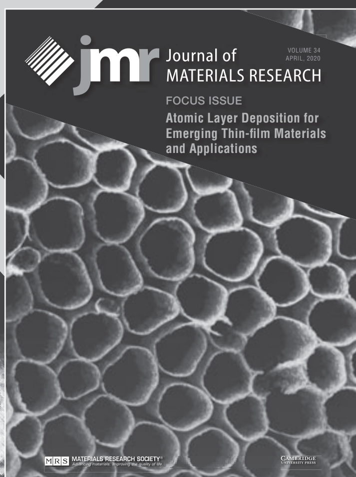

CALL FOR PAPERS

Atomic Layer Deposition for Emerging Thin-film Materials and Applications

Since the 2000s, Atomic Layer Deposition (ALD) has been widely employed to fabricate thin-film materials for a large variety of applications in microelectronics, optoelectronics, catalysis, biomedicine, gas sensing, anti-corrosion coating, clean-energy technologies (batteries, fuel cells, supercapacitors, solar cells, etc.), and nano- and micro-electromechanical systems (N/MEMS). The characteristic merits of ALD include not only its superior controllability over film thickness, composition, and crystallinity, but also its unique capability for constructing conformal thin-film coatings on complex structures. These merits also underlie the fast expansions of ALD into new areas over the past decades, such as metal-organic frameworks, two-dimensional layered materials, single-atom catalysis, solid-state batteries, and so on. Along with these new research trends, more research efforts are urgently needed to develop new ALD precursors for new processes and novel nanostructured materials toward emerging applications in various areas.

The purpose of this Focus Issue is to provide a research forum to exchange the latest outcomes using ALD for emerging thin-film materials and explore the potentials of ALD materials for future applications.

Manuscripts are solicited in the following areas:

- New ALD processes
- ALD precursor chemistry
- Modeling and growth mechanisms of ALD
- Fabrication of novel nanostructures/nanocomposites by ALD (including MLD)
- Emerging applications of ALD materials
  - Microelectronics
  - N/MEMS
  - Optoelectronics and display applications
  - Clean energy technologies (batteries, fuel cells, solar cells, supercapacitors, etc.)
  - Catalysis
  - Sensors
  - Biomedical applications
  - Anti-corrosion coatings

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