MIP: 2DCC at Penn State University DMR-1539916

A roadmap for electronic grade 2D materials

2019

2-dimensional materials hold promise for next-generation electronics. However, in order to realize 2D-based technologies, key milestones must be identified and met. This article identifies areas of research which are fundamentally required for achieving electronic grade 2D materials and brings together experts in these respective areas to discuss key challenges. As a result, this article serves as a roadmap for the realization of 2D materials which can be used in the development of technology toward industries including healthcare, internet of things, highperformance computing, and economical solar energy.

This article can serve as a guide, and a source of inspiration and motivation for researchers and members of the 2D community. Additionally, it communicates the importance of 2D research to the greater scientific community, as well as industry players, demonstrating the current and potential impact of these materials on technology and society. N. Briggs, S. Subramanian, Z. Lin, X. Li, X. Zhang, K. Zhang, K. Xiao, D. Geohegan, R. Wallace, L.-Q Chen, M. Terrones, A. Ebrahimi, S. Das, J. Redwing, C. Hinkle, K. Momeni, A. van Duin, V. Crespi, S Kar and J.A. Robinson, Penn State, ORNL, UT-Dallas, Notre Dame, Louisiana Tech, Northeastern



Image credit: Natalie Briggs Visualization and analysis of atomistic simulation data with OVITO

Also supported by: Semiconductor Research Corporation Intel/Global Research Collaboration Fellowship, task 2741.001; NSF CAREER Award: 1453924; the Center for Atomically Thin Multifunctional Coatings (ATOMIC) under NSF award IIP-1540018; NSF CAREER ECCS 1351424; the Pennsylvania State University Materials Research Institute; the LONI, NSF EPSCoR CIMMOIA-1541079 (CFDA #47.083), LaSPACE- PO0000028218; the US Department of Energy, Office of Science, Basic Energy Sciences (BES), Materials Sciences and Engineering Division and the Center for Nanophase Materials Sciences, which is a DOE Office of Science User Facility; the Center for Low Energy Systems Technology (LEAST), one of six centers supported by the STARnet phase of the Focus Center Research Program (FCRP), a Semiconductor Research Corporation program sponsored by MARCO and DARPA; the SWAN Center, an SRC center sponsored by the Nanoelectronics Research Initiative and NIST; and NSF Award No. 1407765 under the US/Ireland UNITE collaboration.

