

WORKSHOP #7

2D Materials and Beyond

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2D materials are leading candidates for next-generation quantum materials. The properties in 2D layers derived from van der Waals (vdW) layered solids can significantly differ from those in the bulk. More importantly, artificially stacking these 2D materials can in turn lead to a combination of desired properties or even totally unexpected ones not achievable by any single layer. The availability of large-area electronic-grade vdW layers allows carrying out studies at a scale that can bridge discontinuity often encountered between fundamental science and applied research. Development of new tools for fabricating 2D heterostructures in controlled environment opens new avenues for exploring novel materials for device application.

The goal of this workshop is to explore new avenues for international collaborations between BNL scientists and "Science of 2.5 Dimensional Materials" project members supported by MEXT, Japan, which will serve to strengthen and create emerging strategies for improving the fabrication processes of 2D vdW materials, their characterization using advanced tools available at CFN and NSLS-II, and in Japan, develop collaborative user proposals, as well as potential applications targeted for social innovation.

Wednesday, May 25, 2022

Start Time (ET)	Title	Speaker (Affiliation)
8:00 – 8:10 a.m.	Opening Remarks	
8:10 – 9:00 a.m.	Keynote Talk: Science of 2.5 Dimensional Materials	Hiroki Ago Kyushu University
9:00 – 9:40 a.m.	Quantum Material Press at CFN: A Status Update	Kevin Yager BNL/CFN
9:40 – 10:20 a.m.	Robotic Fabrication and Quantum Transport of van der Waals Junctions of 2D Materials	Tomoki Machida University of Tokyo
10:20 – 10:30 a.m.	Break	
10:30 – 11:10 a.m.	Probing the Strain at the Nanoscale by X-ray nano-diffraction: Opportunities and Challenges	Hanfei Yan BNL/NSLS-II
11:10 – 11:50 a.m.	Growth of 1D and 2D Transition Metal Chalcogenides	Yasumitsu Miyata Tokyo Metropolitan University
11:50 – 12:00 p.m.	Wrap-up Day 1	

Thursday, May 26, 2022

Start Time (ET)	Title	Speaker (Affiliation)
8:00 – 8:40 a.m.	Ultrafast Optical Studies of 2D Heterostructures	Mircea Cotlet BNL/CFN
8:40 – 9:20 a.m.	Novel Optical Science and its Application in Monolayer Transition Metal Dichalcogenide and its Heterostructure	Kazunari Matsuda Kyoto University
9:20 – 10:00 a.m.	Charge, Spin and Lattice Interactions in Strongly Correlated Quantum Materials Revealed by Advanced Electron Microscopy	Yimei Zhu BNL/CMPMS
10:00 – 10:40 a.m.	Physics of Twisted 2D Materials	Mikito Koshino Osaka University
10:40 – 11:20 a.m.	Band Structure Engineering in Bi ₂ Se ₃ and VSe ₂	Turgut Yilmaz BNL/NSLS-II
11:20 – 11:30 a.m.	Workshop Wrap-up	
11:30 – 12:00 p.m.	Panel Discussion	