PHYSICS COLLOQUIUM:
Tailoring the Properties of 2D Materials from Controlled Synthesis

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Date:
4/23/2021

Time:
10:30 AM-11:50 AM

Link:
Please contact snsgradstaff@ucmerced.edu for the Zoom link and passcode.

About the Speaker:

Prof. Hui Cai is an assistant professor in the Department of Physics at the University of California, Merced. Prior to Prof. Cai's appointment at UC Merced, he was a postdoctoral research associate at Oak Ridge National Laboratory in Dr. David B Geohegan's group. Prof. Cai received his PhD degree from Arizona State University working with Prof. Sefaattin Tongay. Prof. Cai is an experimental condensed matter physicist and materials scientist. His work focuses on discovering new quantum materials and 2D materials through cutting-edge synthesis methods and tailoring their properties by introducing heterogeneities. He has published 39 SCI-indexed research articles and has an h-index of 19. He serves as the reviewer for multiple journals including Advanced Materials, Advanced Functional Materials, Applied Physics Letters, Journal of Applied Physics, etc.

Abstract:

Two-dimensional materials have attracted extensive research interests due to their intriguing properties. 2D gallium chalcogenides are semiconductors whose bandgaps cover a wide range of energy spectrum and have great potentials in high-performance optoelectronic devices. Transition metal dichalcogenides (TMDC) in the 1T' phase are 2D topological insulators that can find applications in quantum information science. Pushing these materials toward applications requires controllable synthesis methods and facile routes for tailoring their properties on demand. In this presentation, I will show the synthesis of 2D gallium chalcogenides and 1T'-TMDC with controlled structure, morphology, and properties from the bottom-up approach. Multiple routes, including strain engineering, defect engineering, and phase engineering, have been applied to manipulate the physical properties of these materials. Our work provides insights for achieving tunable properties in 2D semiconductors and quantum materials through controlled synthesis.

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