Strain engineering 2D quantum materials

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Abstract

Strain engineering in electronics has been widely utilized over the last 20 years to enhance carrier mobility in most standard Si-based CMOS fabrication processes. These process-induced strain engineering techniques, engineered from the nanofabrication process itself, are simple, reliable, applied device-to-device, and highly scalable down to the nanometer scale. In this talk, I will introduce our groups work in exploring how process-induced strain engineering translates to the world of 2D materials, and how this may be applied to engineer quantum materials properties. Control over the strain degree-of-freedom in 2D materials opens new pathways for exploration in engineered quantum materials, since strain in weakly-bonded 2D systems can go far beyond strain-engineering in conventional 3D-bonded materials. This will be discussed in the context of two different ongoing projects in our group: 2D straintronic phase-change transistors/memristors, and moiré superlattice engineering with strain in twisted and untwisted bilayer 2D heterostructures.

Bio

Stephen M. Wu is an Assistant Professor at the University of Rochester in the Department of Electrical and Computer Engineering and the Department of Physics and Astronomy. His research interests involve engineering quantum materials to create novel electronic or quantum devices. For work in this area, he has won the NSF CAREER award in 2020. Before Rochester, he was a postdoctoral researcher at Argonne National Laboratory within the Materials Science Division. He received his Ph.D. in Physics, B.S. in Electrical Engineering and Computer Science, and B.A. in Physics all from the University of California, Berkeley.

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