Angle-resolved Polarized Raman study of 2-dimensional Cr_2Se_3

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Abstract:

Two-dimensional (2D) materials have revolutionized the field of materials science and engineering, offering a wide range of intriguing properties, including electronic, optical, and optoelectronic properties. However, one notable absence in this family was 2D magnets. Fortunately, recent years have witnessed significant progress in the discovery of atomically thin magnetic materials, filling this void. These 2D magnetic materials hold tremendous potential for various applications across numerous fields, including spintronics, magnetic sensors, energy conversion and storage, catalysis, and biomedicine. Their exceptional properties, coupled with the ability to finely tune their magnetic behavior, pave the way for the development of innovative technologies with improved performance, energy efficiency, and miniaturization. As research in this exciting field continues to advance, we anticipate further breakthroughs and novel applications that will shape the future of technology and contribute to societal advancements. In this work, we focus on the synthesis of triclinic Cr_2Se_3 using the Chemical Vapor Deposition (CVD) method on Si/SiO2 substrates. Furthermore, we demonstrate through Angle-resolved polarized Raman spectroscopy that these materials exhibit anisotropy, providing valuable insights into their structural and magnetic properties. Electrical transport properties of bulk-Cr_2Se_3 synthesized by the chemical vapor transport method will also be presented.

Biography:

I am currently a Ph.D. candidate in the Department of Physics and Astronomy at the University of Louisville. I completed my bachelor's degree in applied physics at Palestine Polytechnic University in the West Bank, and subsequently pursued my master's degree in physics at UofL. As a member of the condensed matter research group under the guidance of Dr. Gamini Sumanasekera, my research focuses on the synthesis and comprehensive characterization of low-dimensional materials, delving into their unique properties and potential applications. To unravel the mysteries of these materials, I employ an array of techniques, including Angle-Resolved Polarized Raman spectroscopy, Magnetooptics Kerr effect, mechanical strain analysis, magneto-resistance measurements, thermoelectric investigations, and Hall effect measurements. Through my work, I aim to contribute to the advancement of our understanding of these fascinating materials and their practical utilization in various fields.