Wafer-scale high-performance 2D field-effect transistors with engineered contacts, dielectrics, and channels.

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In this talk, I will introduce our recent progress related to contacts, dielectrics, and channels in 2D semiconductor-based field-effect transistors (FETs). We have researched transition metal dichalcogenides (TMDs) as next-generation channel materials beyond Si for continuing transistor scaling. To get the high-quality scalable wafer-scale MoS_2 films on amorphous substrates, we have developed the metal-organic chemical vapor deposition (MOCVD) techniques. Furthermore, we have successfully grown single-crystalline MoS_2 on selected areas. Through the optimized integration processes, we have fabricated 2D FETs on 8-inch wafers. I will share some recent findings in integration and device results, particularly focusing on contact and dielectric engineering advancements.
Additionally, this presentation will address the remaining challenges associated with materials growth and device fabrication, with the aim of meeting the industrial requirements for 2D FETs.