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RESEARCH HIGHLIGHT

Making wafer-scale 2D semiconductors

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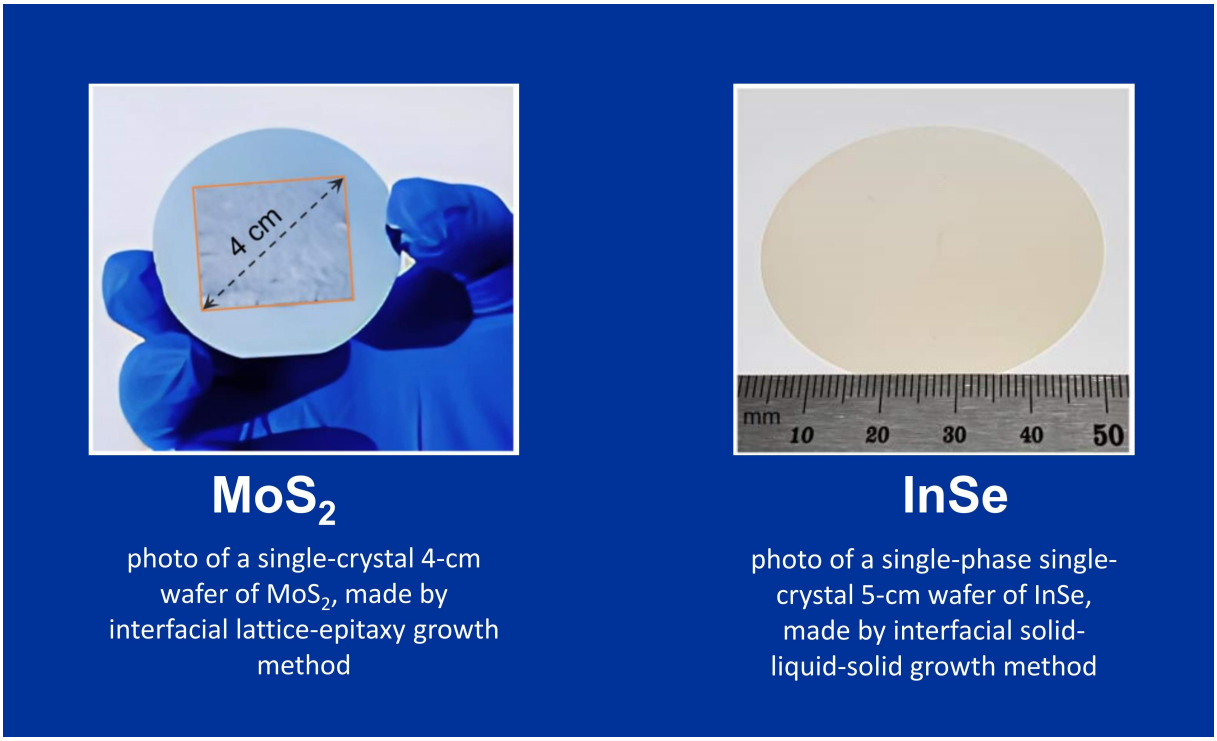
Author introduction

Feng Liu is currently a distinguished and Ivan B. Cutler professor in the Department of Materials Science and Engineering, University of Utah.



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Abstract This video article highlights the recent works by Prof. Kaihui Liu's group at Peking University in making wafer-scale 2D semiconductor thin films. In contrast to conventional epitaxial surface growth methods, they have developed two novel epitaxial interface growth methods, which have enabled them to make various 2D semiconductors in wafer scale for device fabrication. As exemplified in this video highlight, using the novel interfacial lattice-epitaxy growth method, they have successfully made single-crystal 4-cm wafers of MoS_2, with a thickness ranging from 1 to ~1500 layers, of high crystallinity and uniformity. Furthermore, they fabricated mono-, bi-, and tri-layer MoS_2 transistors, whose electrical performance exceeds the IRDS 2028 mobility target. Also, using the interfacial solid-liquid-solid growth method, they have made single-phase single-crystal 5-cm wafers of InSe multilayer films and fabricated integrated circuits of transistor arrays with a performance matrix surpassing the Si Intel 3nm technology.

Keywords interfacial lattice-epitaxy, interfacial solid-liquid-solid growth, 2D semiconductor wafers

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