

ISGD7

*7th International Symposium on Graphene Device
25 - 28 July, 2022 / WASHINGTON, D.C*

New Functional Heterostructures Through Low-Temperature Growth of van der Waals Materials

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The low-temperature growth of van der Waals materials opens the door for new integration schemes for nanoelectronic, optoelectronic, and spintronic devices. Functional heterostructures of different transition metal dichalcogenides (TMDs), topological insulators with TMDs, multiferroic oxides with magnetically doped TMDs, and 2D/3D semiconductor stacks will all be discussed focusing on their synthesis, interface quality, and the devices they enable. These unique heterostructures enable exhibit phenomena such as hyperbolic dispersion, high spin-orbit torque efficiencies, electric-field control of ferromagnetism, and high-performance monolithically 3D integrated transistors for integrated circuits.