GrapheneforUS

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2D Materials for Industry

Abstract

Semiconductor sales will reach over $500 billion worldwide in 2021, a gigantic industry that keeps on growing with increasing demand for faster, more powerful, and smaller chips. However, as we keep scaling, the silicon (Si) transistor will soon reach its physical limit, and there is a pressing need to find an alternative post-Si material to enable the continuation of Moore's Law. In the early 2000s, scientists discovered that graphite could be exfoliated down into an atomic form, going from a 3D bulk material down to a 2D stable honeycomb lattice of carbon atoms called graphene. Scientists marveled at graphene's astonishing electrical and mechanical properties, however, for all that graphene has to offer, it lacks a band gap that is essential for logic devices. This created a surge in research on materials beyond graphene, scientists searching for an elusive 2D material that would possess a bandgap to satisfy the need of the semiconducting industry. Monolayer Transition Metal Dichalcogenides (TMDs) possess the bandgap that graphene lacks, and with the vast variety of TMDs available, coupled with its encouraging electrical properties, make TMDs a promising candidate.

In this talk, I will present some of Intel's published research on 2D materials focusing on TMDs, from synthesis and characterization to innovative applications. I will demonstrate, that in Components Research at Intel, we are continuously looking at ways to improve future technologies, and enable the continuation of Moore's Law.

References

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