

Synergies in Flatlands: van der Waals layered materials meet freestanding oxides

During the last decades, there have been tremendous advances in the study and application of 2D Van der Waals (vdW) materials. Beyond the remarkable properties that emerge when thinning these materials to a single layer [1-3], the ability to stack and rotate multiple layers relative to each other has led to the creation of metamaterials presenting radically new phenomenology [4,5].

But, is this field restricted to layered vdW systems? In this talk, I will explore how the knowledge gained from studying vdW systems can be extended to other families of materials that, at first glance, are not as easily exfoliable. One of the latest additions to the flatland landscape are the transition metal oxides (TMOs), a family presenting a wide range of strongly correlated physics, rarely found in 2D VdW materials. Freestanding oxide membranes have recently emerged as a promising platform, offering new opportunities for experimentalists to design materials with novel properties [6,7]. This talk will provide examples of how these two families of materials can be synergistically integrated, using van der Waals manipulation strategies, to fabricate novel hybrid 2D heterostructures that expand their potential applications [8,9].

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