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## Controlling surface van der Waals interactions with monolayer materials

Physical phenomena occurring at the nanoscale often have no analogues in the macroscopic world. In this regard, nanomaterials offer exciting opportunities to create unique physical devices and effects. This presentation focuses on monolayer materials, a class of crystalline 2D solids with a thickness of less than 1 nm and their unprecedented capacity to modify surface interactions. Forces operating at solid surfaces, such as the van der Waals force and hydrogen bonding, determine outcomes of many common phenomena from liquid spreading (wetting) to adhesion of particles to bio adhesion. Remarkably, these forces are confined within the nanoscale from the surface: van der Waals within 20 nm and the hydrogen bonding within 1 nm. A simplified picture of such short-range forces effectively attributes them to the surface and a few sub-surface atomic layers of the solid. In this context, the recent advent of the atomically thin monolayer materials offers an unprecedented opportunity to build surface interactions in a bottom-up approach, by sequentially applying different monolayers on top of existing surfaces. Our work focuses on fundamental understanding of how the monolayer materials modify surface van der Waals interactions and this presentation highlights novel physical phenomena, unique to the monolayer materials, such as van der Waal screening.

### Biography

Stanislav Tsoi had pursued his PhD in Physics from Purdue University. He had conducted his Postdoctoral work at US Naval Research Laboratory (NRL) and later was hired as a Research Scientist at NRL. His research interests include monolayer materials, nanoplasmonics and nanophotonics and solid oxide fuel cells.

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