**Thickness Dependent Electronic Properties of Pt**

**Dichalcogenides – PtX2 (X = S, Se, and Te)**

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Using first-principles calculation, we explore the tunability of the electronic properties of PtX2 (X = S, Se, and Te) with respect to the film thickness. We examine different known structures, including 1T, 2H, and 3R. For bulk and layered structures (1 to 10 layers), octahedral 1T is the most stable. Surprisingly, we also find that the 3R structure has comparable stability relative to the 1T, implying possible synthesis of 3R. For a bulk 1T structure, PtS2 is semiconducting with an indirect band gap of 0.25eV, while PtSe2 and PtTe2 are both semi-metallic. Still, all their corresponding monolayers exhibit an indirect semiconducting phase with band gaps of 1.68eV, 1.18eV, and 0.40eV for PtS2, PtSe2, and PtTe2, respectively. For the layer dependence of band properties, we observe that all PtX2 transition metal dichalcogenides (TMDs) manifest decreasing/closing of indirect bandgap with increasing thickness, a consequence of quantum confinement and interlayer interaction. Moreover, we discover that applying strain can manipulate van Hove singularity resulting to high density of states at the maximum valence band. Our results show that the sensitivity and tunability of electronic properties of PtX2 pave a new path for future potential applications.