2D Materials

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Graphene, it’s brothers/sisters and cousins

The 2D Family

- Graphene, Silicene*, Germanium*
  - No Bandgap
  - Ballistic Transport (in ideal material)

- transition metal dichalcogenides (TMDC or TMCS): MoS^2, WS^2 , $MoSe^2$, WSe^2 , $MoTe^2$
  - Large direct Bandgap
  - Low conductivity
  - Piezoelectricity (along the 2D plane)
  - Similar to Group III Monochalcogenides (e.g. GaSe

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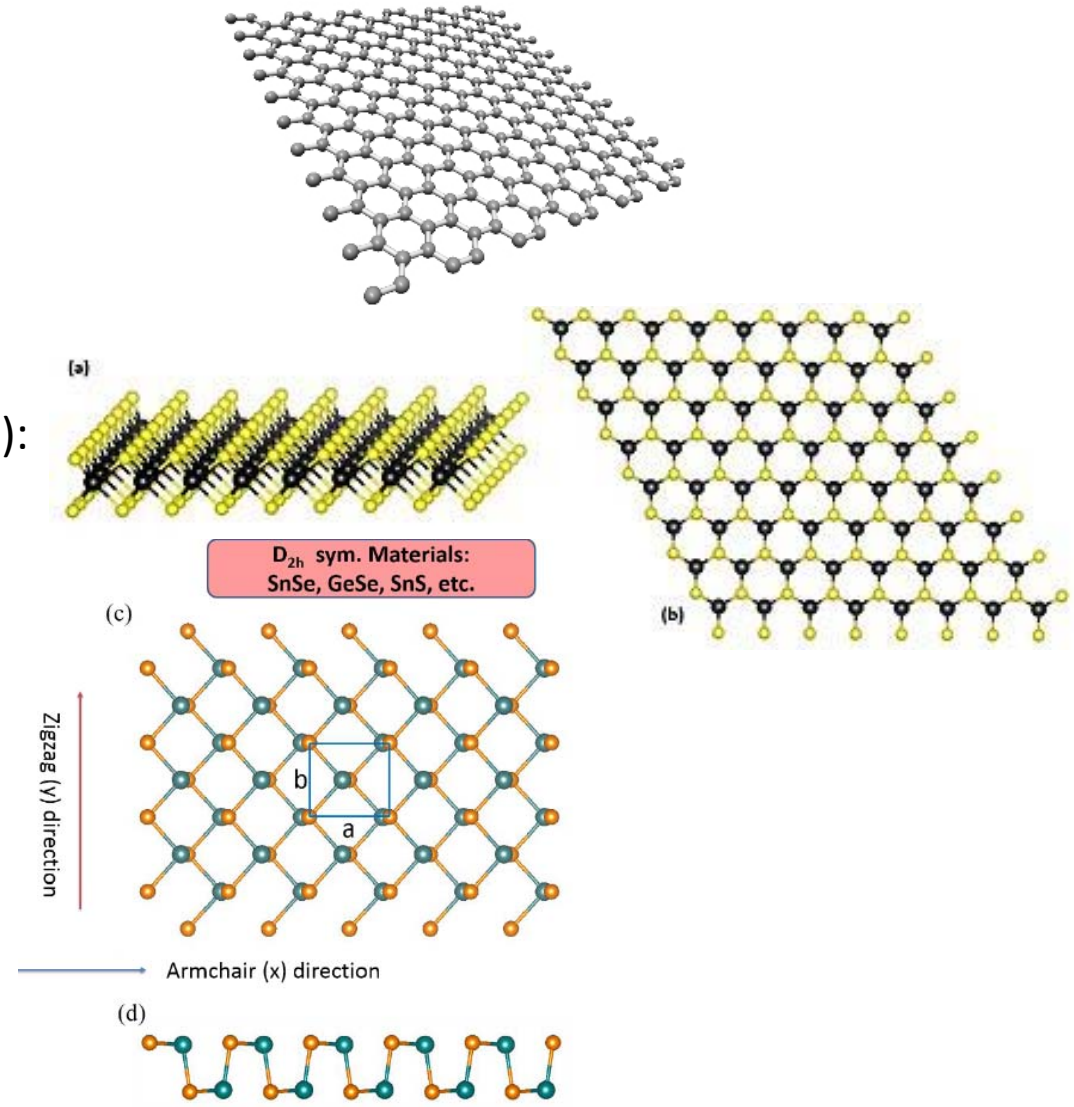
- Group IV Monochalcogenides: SnSe, SnS, GeSe and GeS
  - Large indirect bandgap
  - Piezoelectricity (along the 2D plane)

*Unstable



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Common Challenges:

- Modified Bandstructure, through e.g. doping
- Transport Properties, Device Modelling, particularly frequency response
- Hybrid (substrate+2D Material)
- Van Der Walls Heterostructures (need decent models for VanderWalls interactions