

MACHIDA LAB.

[2D material: physics in one atomic layer]

Center for Photonics Electronics Convergence

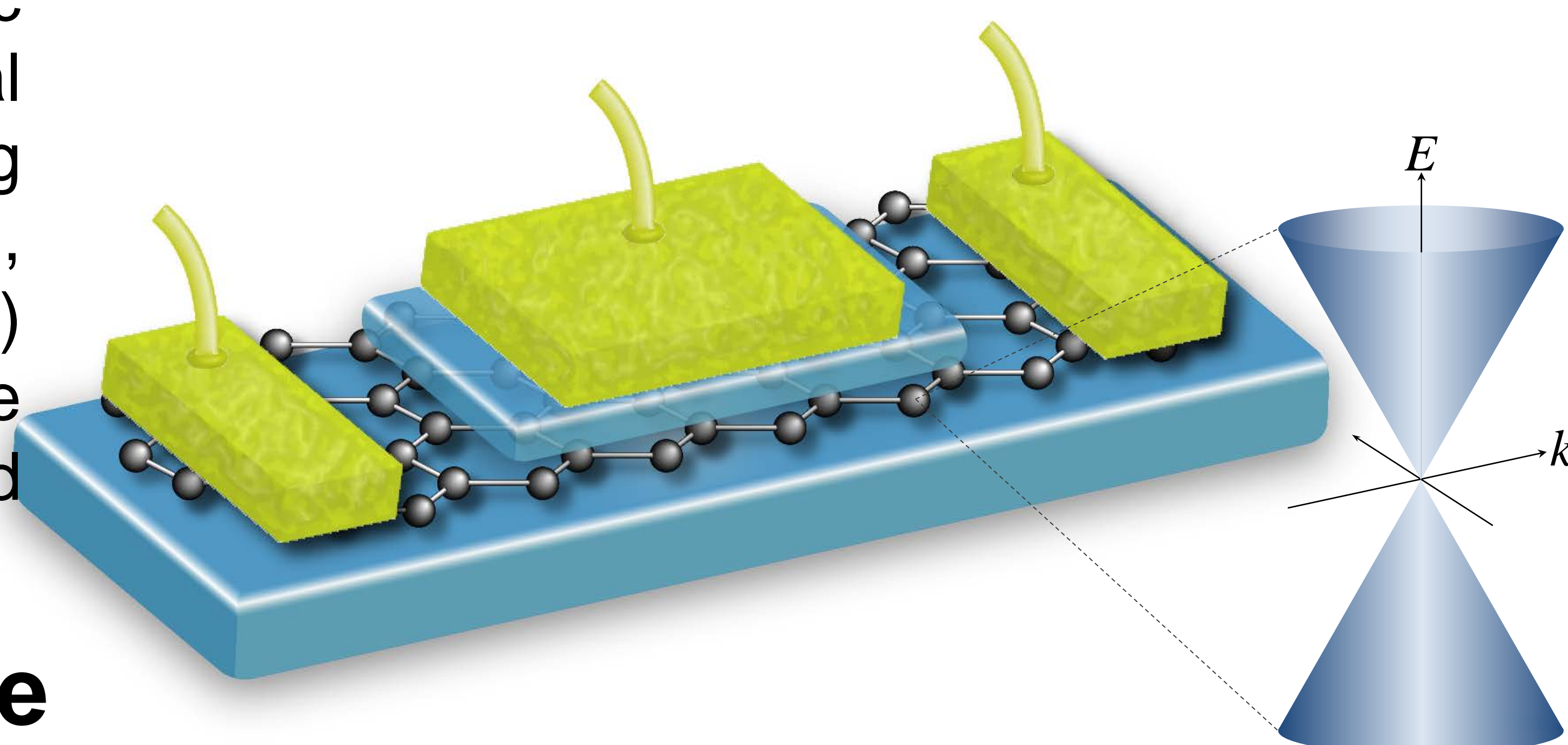
<http://qhe.iis.u-tokyo.ac.jp>

Quantum semiconductor spintronics

Department of Materials Engineering/Department of Applied Physics, Graduate School of Engineering

Quantum phenomena in massless Dirac fermions

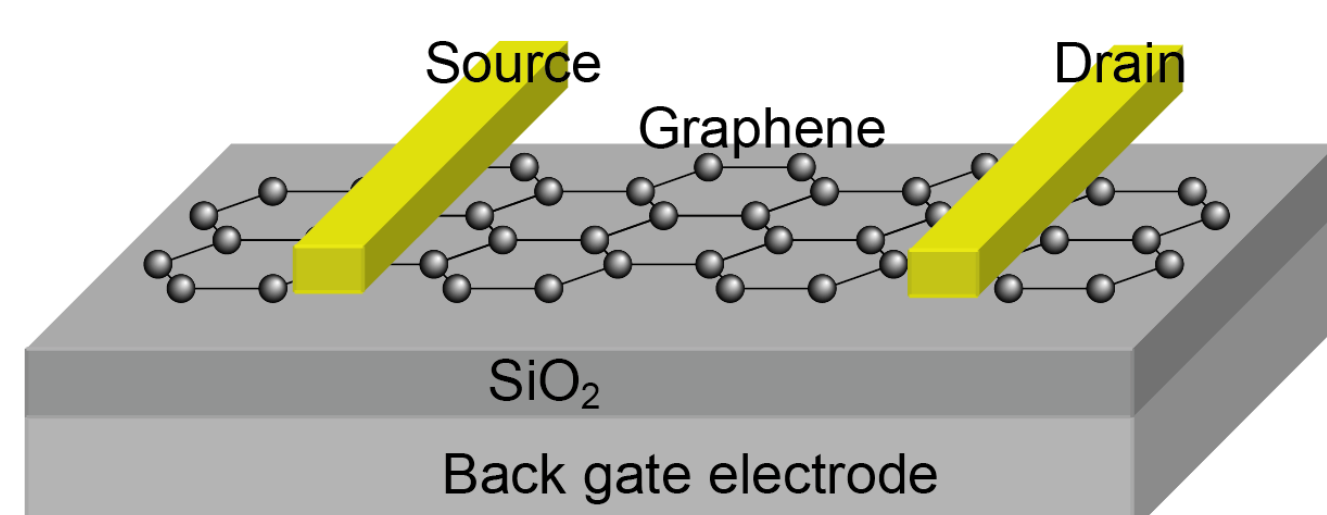
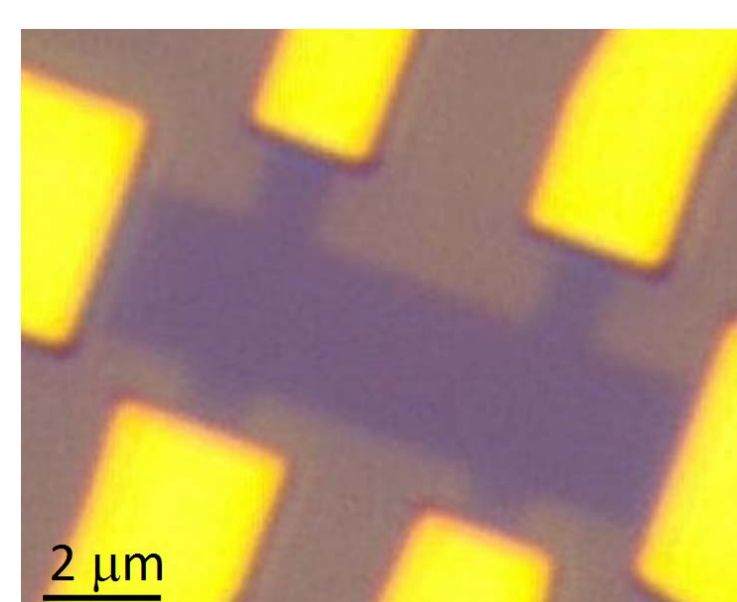
The graphene and other one atomic layer thick crystals reveal unusual quantum physics. By combining material science, nano-fabrication, and low temperature (~ 10 mK) measurement, we explore the science and the engineering of graphene and two-dimensional crystals.



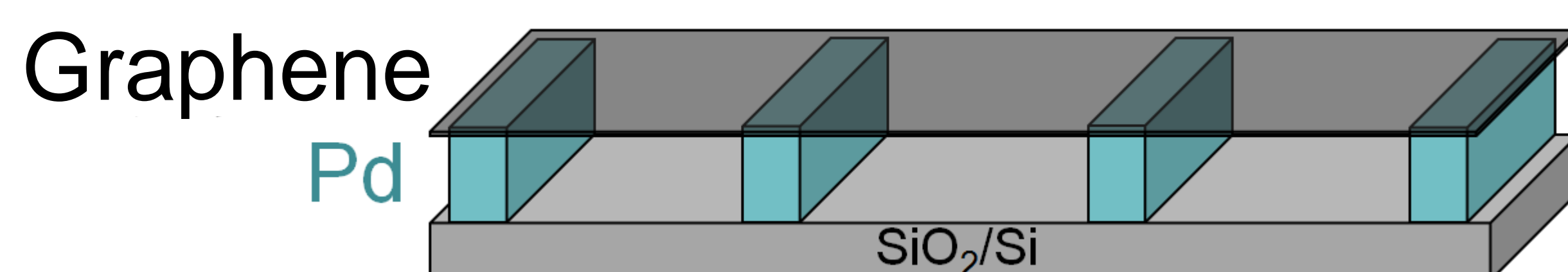
Applications of graphene

Electronics

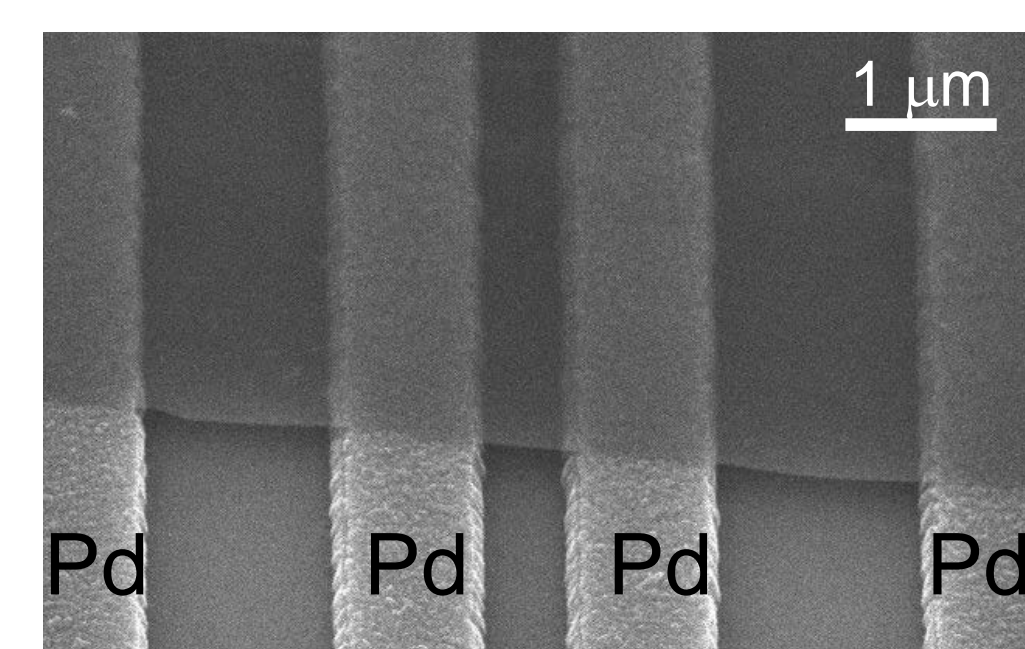
- High carrier mobility
- High thermal conductivity
- Flexible



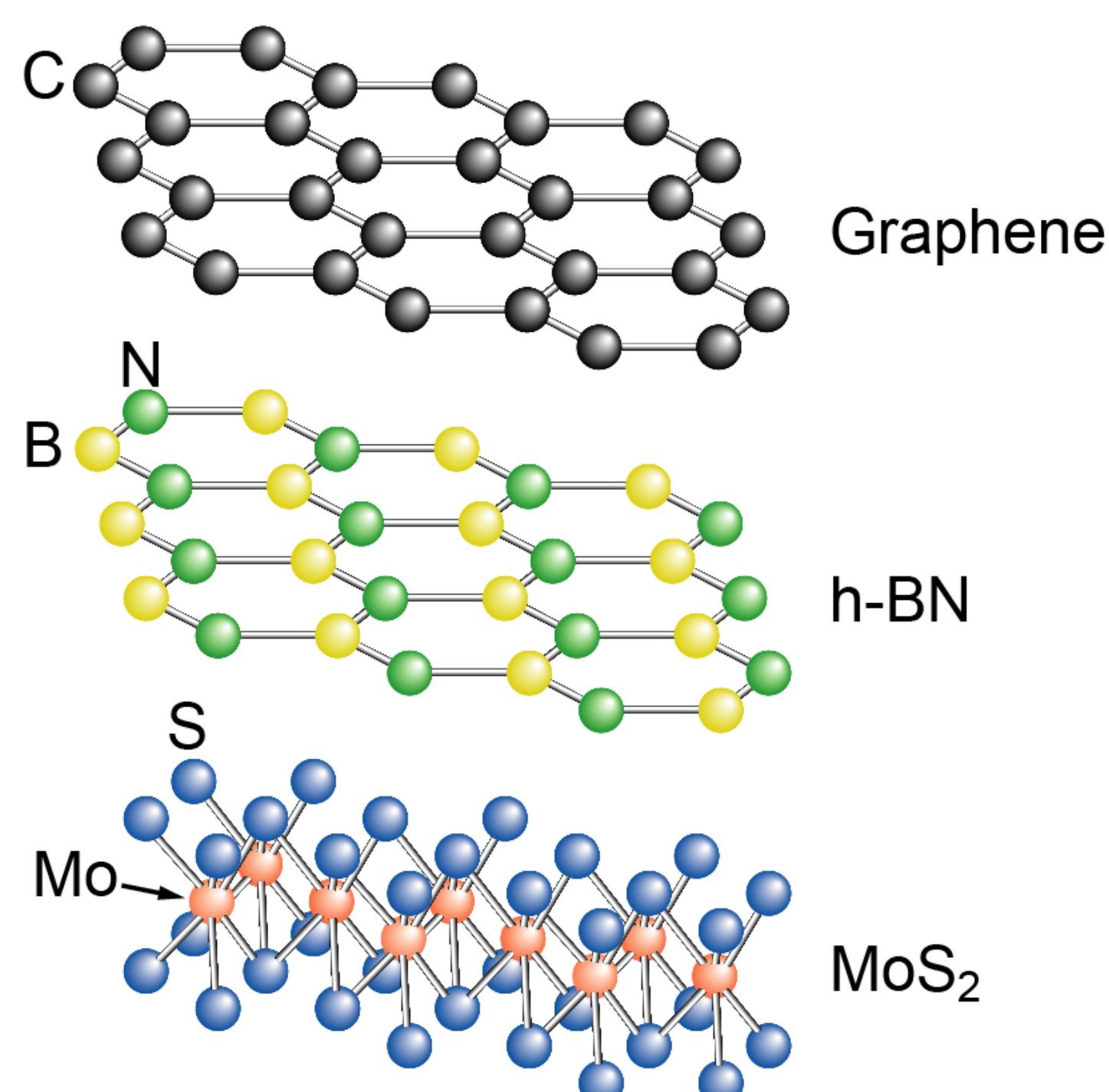
Micromachines



- High strength
- Graphene mechanics
- One atomic layer thick micromachines

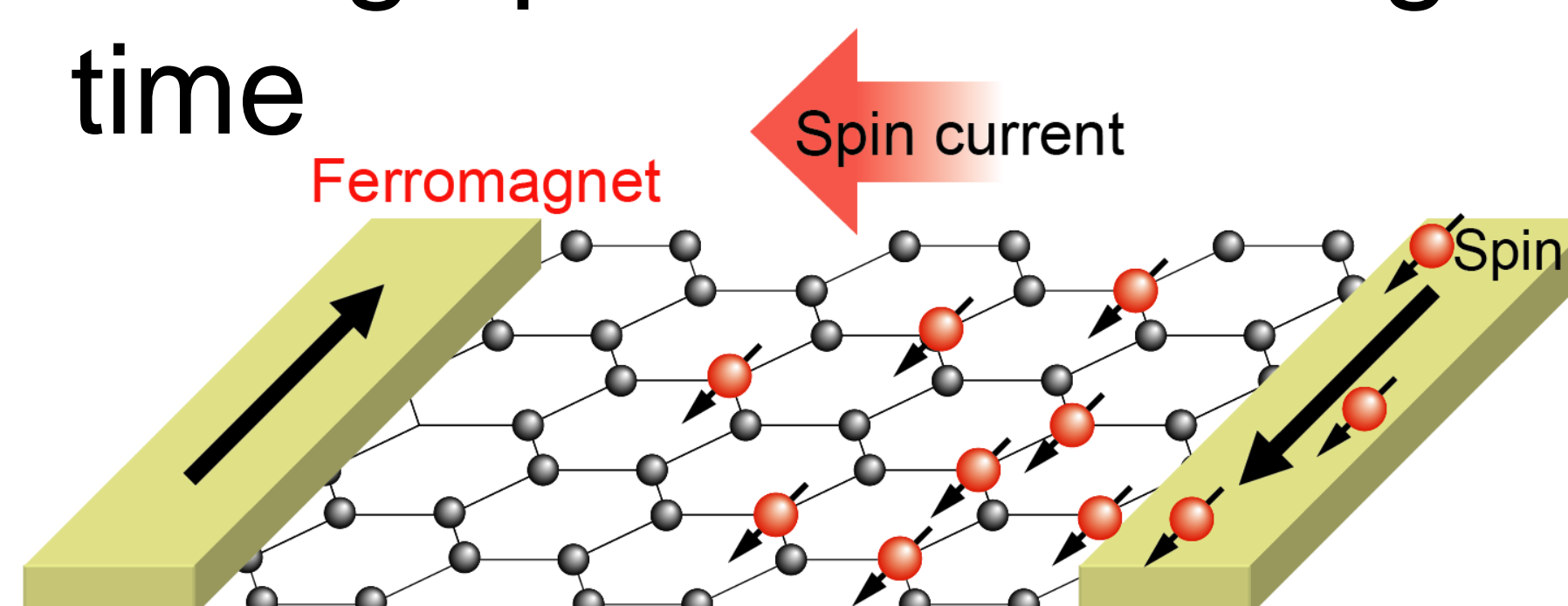


2D crystals



Spintronics

- Small spin orbit coupling
- Small nuclear spin coupling
- Long spin diffusion length time



Optoelectronics

- Ultra broadband
- Fast response time
- High temperature operation

