2D materials is the future: From fundamentals to electronics

www.swissBN.ch

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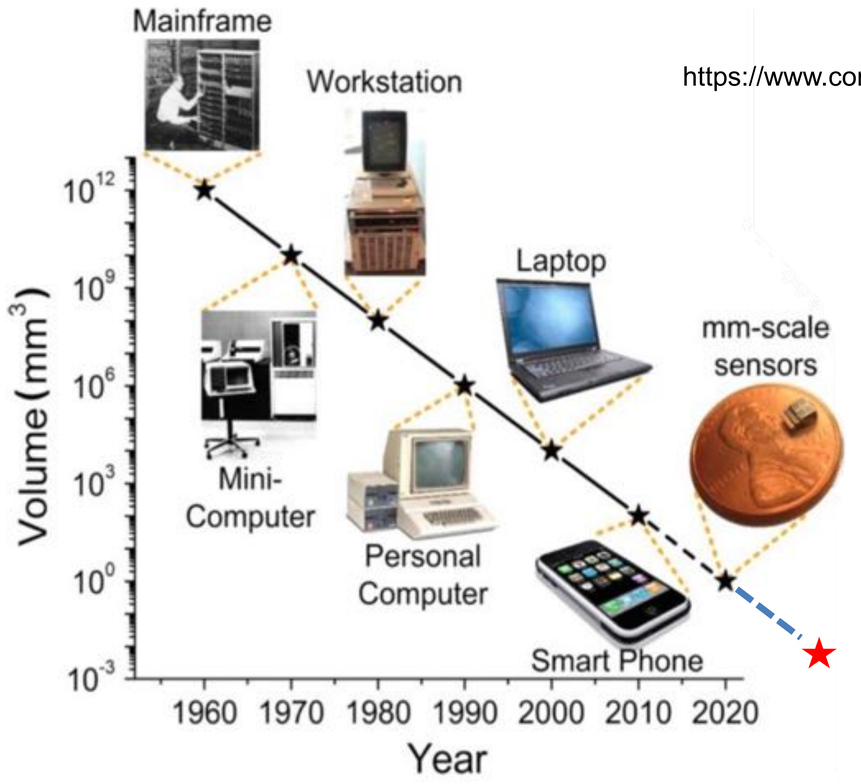
Two-dimensional (2D) materials, e.g., graphene, are wonder materials. Hexagonal boron nitride (h-BN) is a strategic 2D material because of its flexibility, transparence, strong mechanical properties and excellent chemical stability. It has huge impact on fast 2D electronics.

The evolution of computer classes



https://www.computerhistory.org

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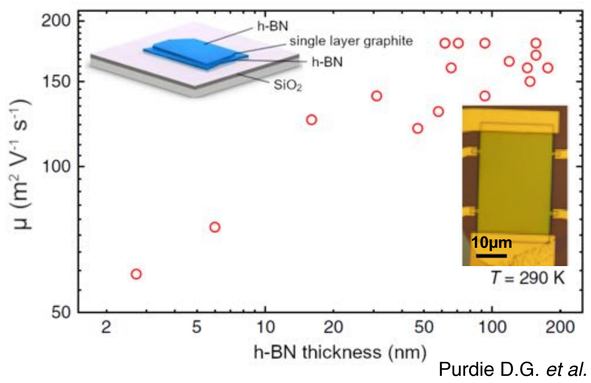
2D electronics

State of the art 2D electronics

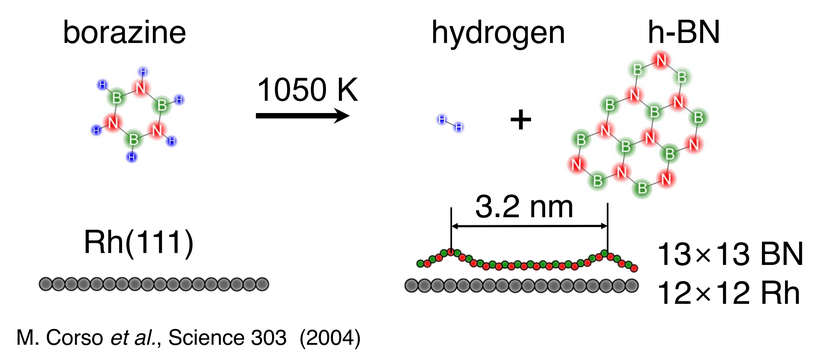


Purdie D.G. *et al.* Nat. Commun., 2018

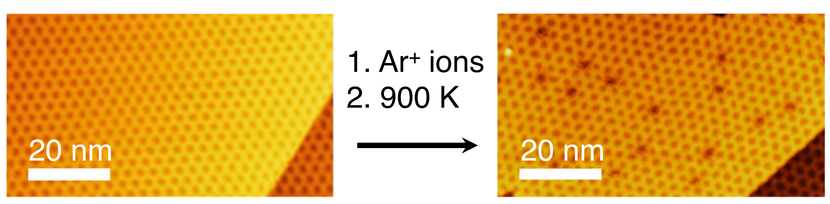
Electron mobility in 2D-hall bar geometry is 10^5 times better than Si-based electronics

Scotch-tape method for lab-scale (~ μm) device fabrication, not suitable for industrialization.

Fundamentals of 2D materials @UZH



M. Corso *et al.*, Science 303 (2004)



h-BN nanomesh on Rh(111) — nanovoidal BN (v-BN)

UHV-CVD surface fabrication knowledge since 1997

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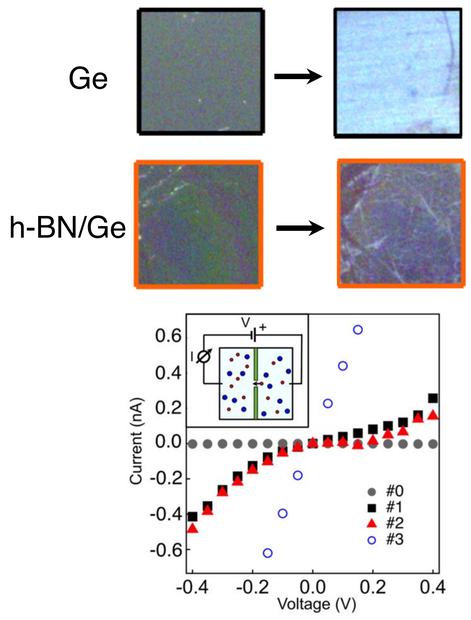
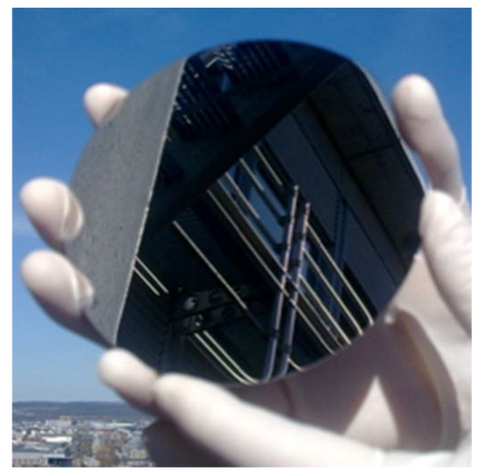
Upscaling of 2D material fabrication



H. Cun *et al.*, Nano Lett. 18 (2018)

h-BN membranes research outside of UHV



A. Hemmi *et al.*, Rev. Sci. Instrum. 85 (2014)

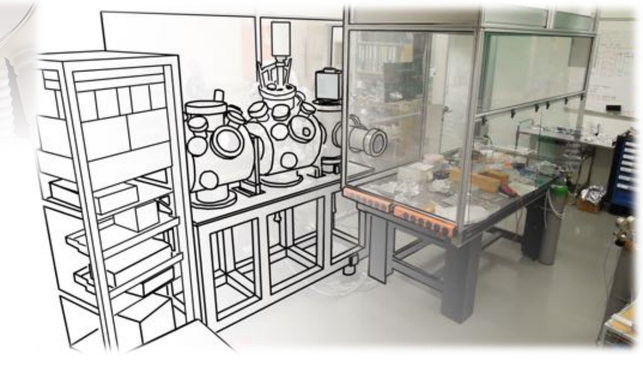
4 inch h-BN coated wafer in Zürich air

UZH 2D electronics roadmap

superior technology

innovative robotics

advanced infrastructure



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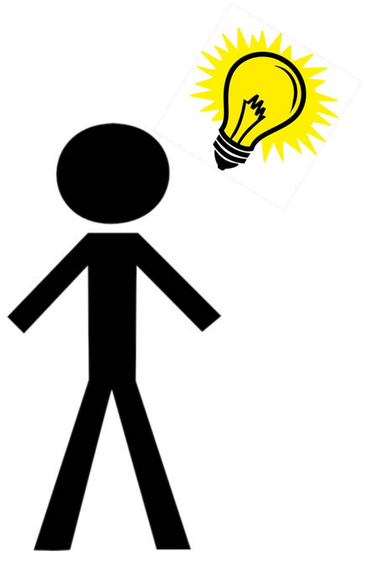
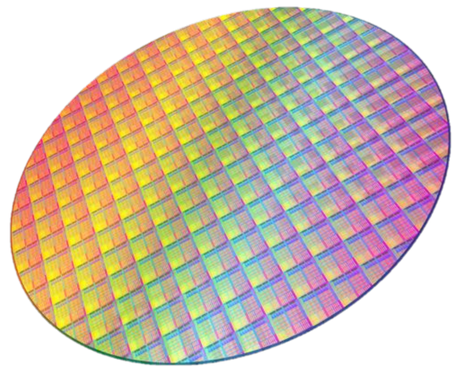


Projects:

– graphene/h-BN device fabrication
– wafer-scale 2D materials transfer
– nanovoidal 2D membrane applications in gas and in liquids



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