

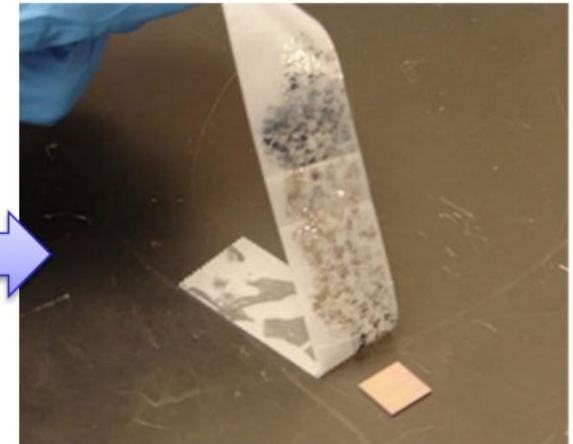
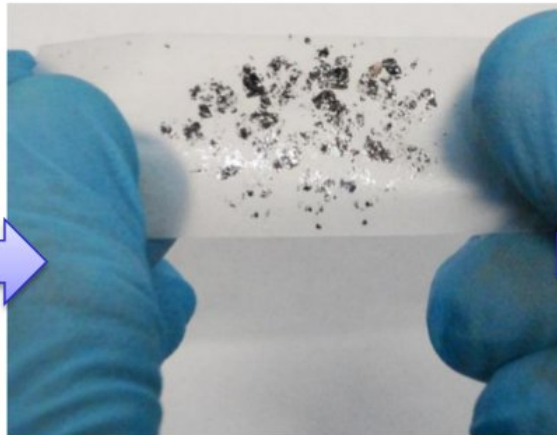
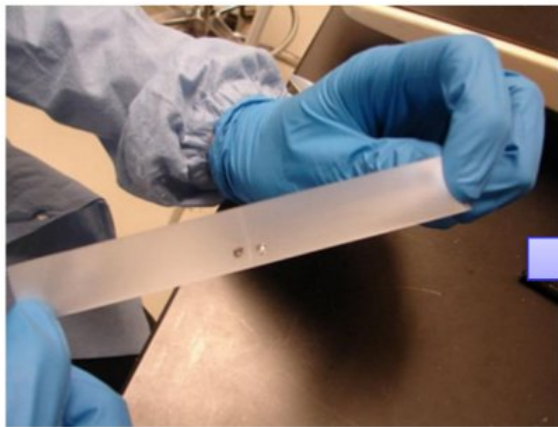
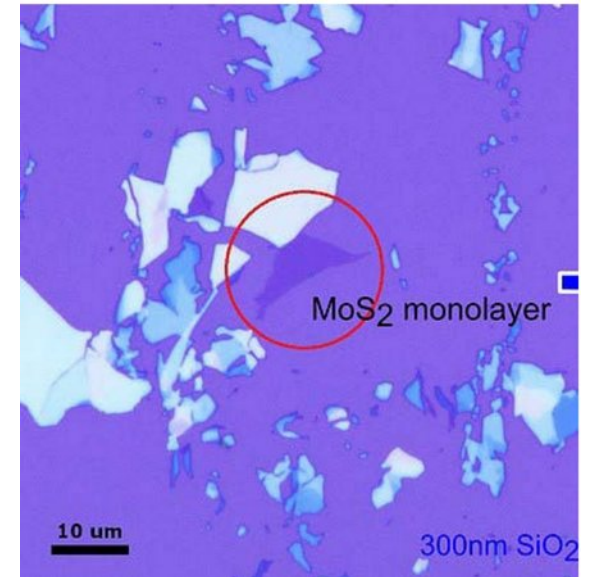
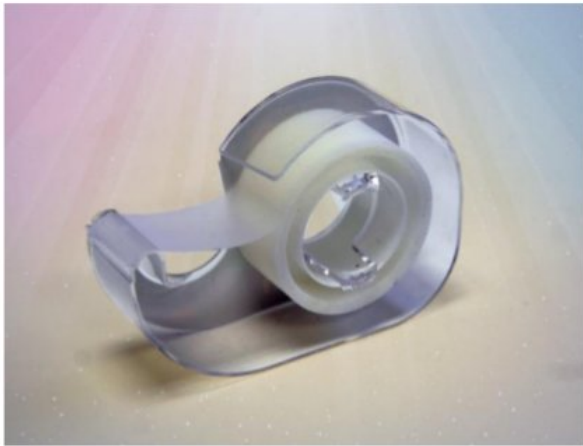
Φ – 575 Διάλεξη 06

Φυσική διατάξεων δισδιάστατων ημιαγωγών

Γιώργος Δεληγεώργης (deligeo@physics.uoc.gr)



Exfoliation how it works



Exfoliation – The original method

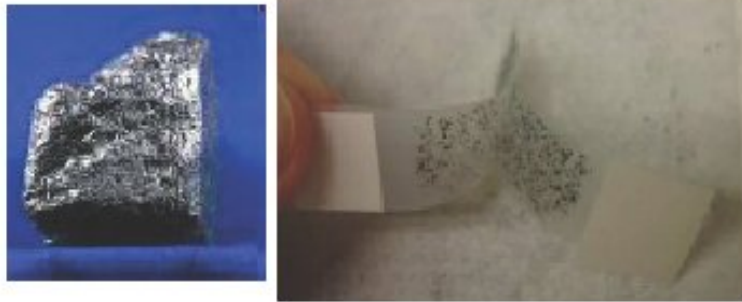
Two-dimensional crystals are thermodynamically unstable!

R.E. Peierls, Ann. I.H. Poincare 5 (1935) 177

N.D. Mermin, Phys. Rev. 176 (1968) 250

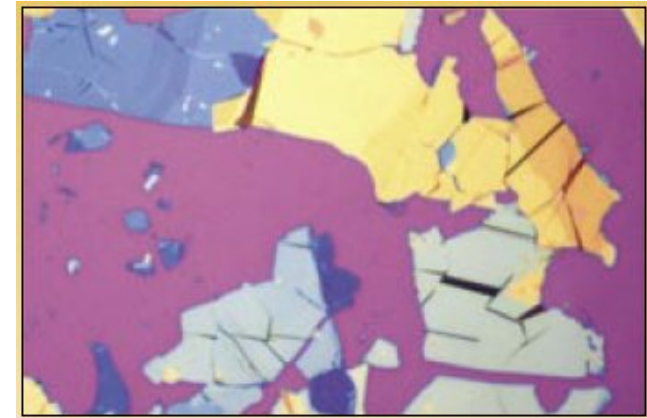
L.D. Landau, E.M. Lifshitz, Statistical Physics, Pergamon (1980)

“exfoliation” (scotch tape)

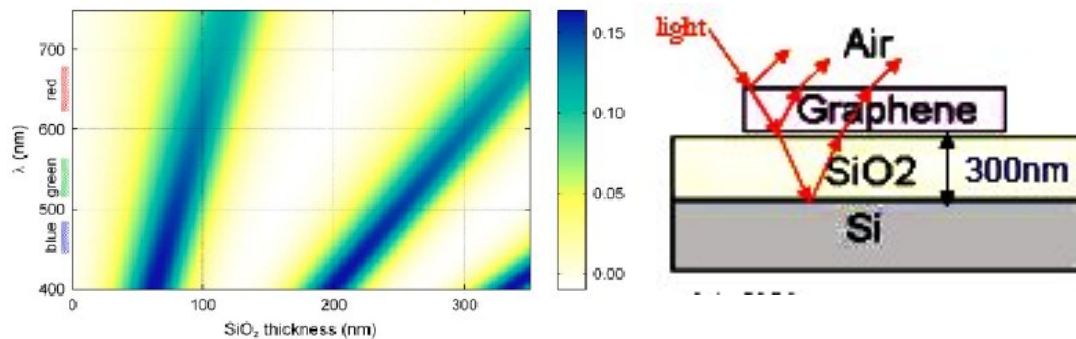


Y.Cheng, and I. Jovanovic, Perdue Univ.

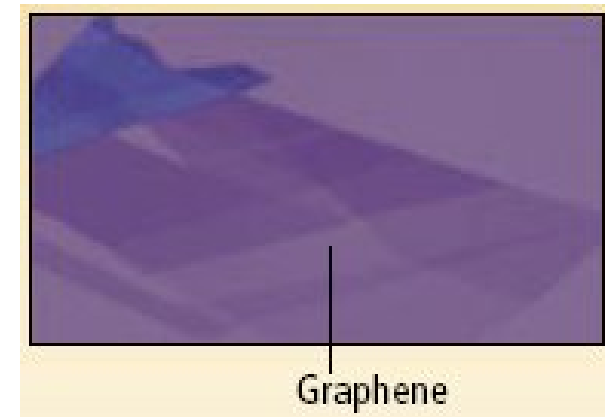
http://www.physics.purdue.edu/quantum/Talks/ari_2009b.pdf



A.K. Geim, P. Kim, Sci. Am., April 2008, 90

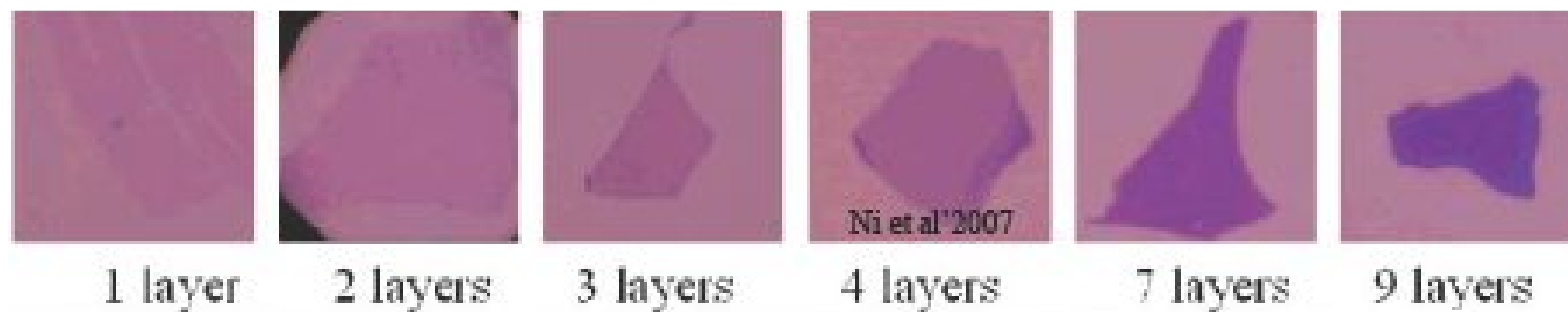


P. Blake et. al, App. Phys. Lett. 91,0631 (2007)



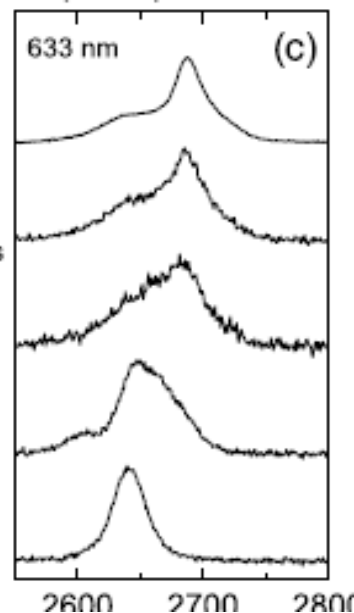
thickness $\cong 0.34$ nm

Detecting graphene / 2D layers



Optical view

Z.H. Ni et. al., Nano Lett., pp.2758-2763 (2007)



graphite

Raman signature

Single layer

*Only small flakes available
In arbitrary locations!
NOT good for production*

*The best graphene quality!
Good for material study and
Proof of concept devices*

A.C. Ferrari et. al., Phys. Rev. Lett. 97 , 187401 (2006)