

Φ – 575 Διάλεξη 07

Φυσική διατάξεων δισδιάστατων ημιαγωγών

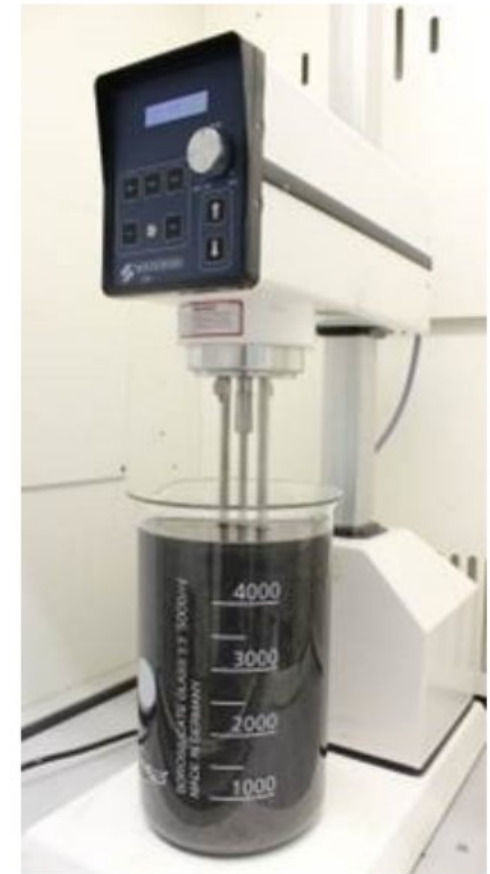
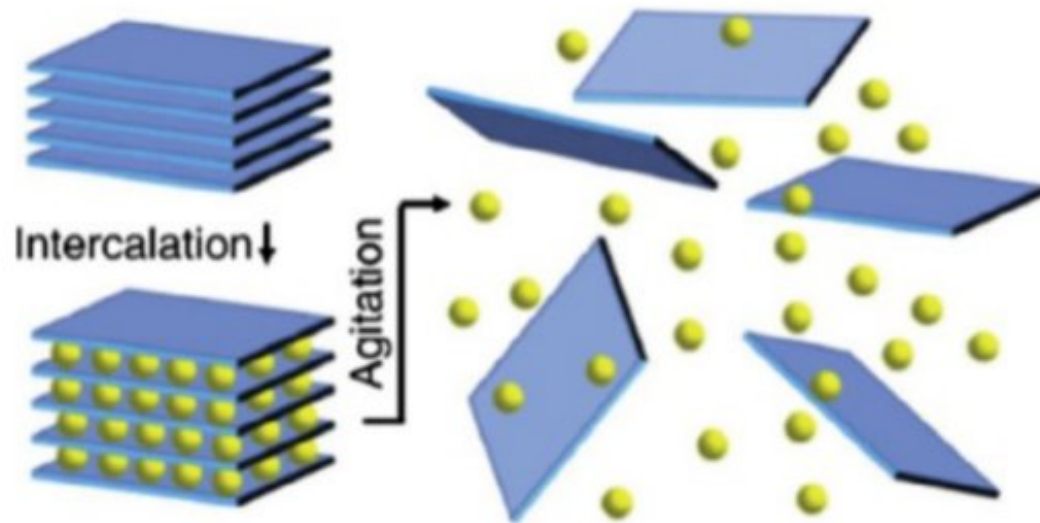
Γιώργος Δεληγεώργης (deligeo@physics.uoc.gr)

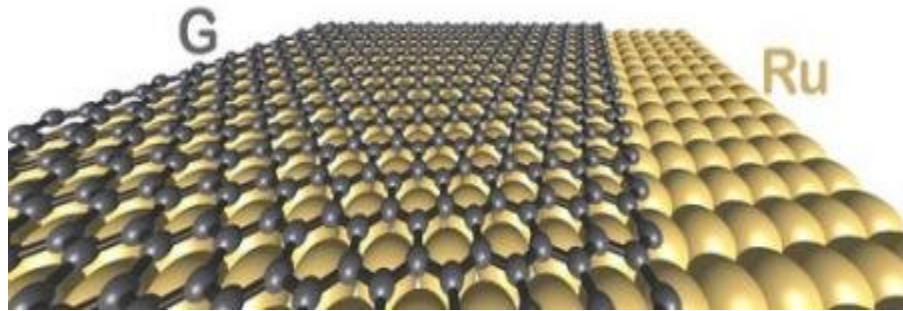


Χρησιμοποιώ αρχικό φυλλομορφο υλικό

Μια πηγή ενεργειας (sonicator)

Και καποιο χημικό που βοηθάει την αποφολίδωση (surfactant)





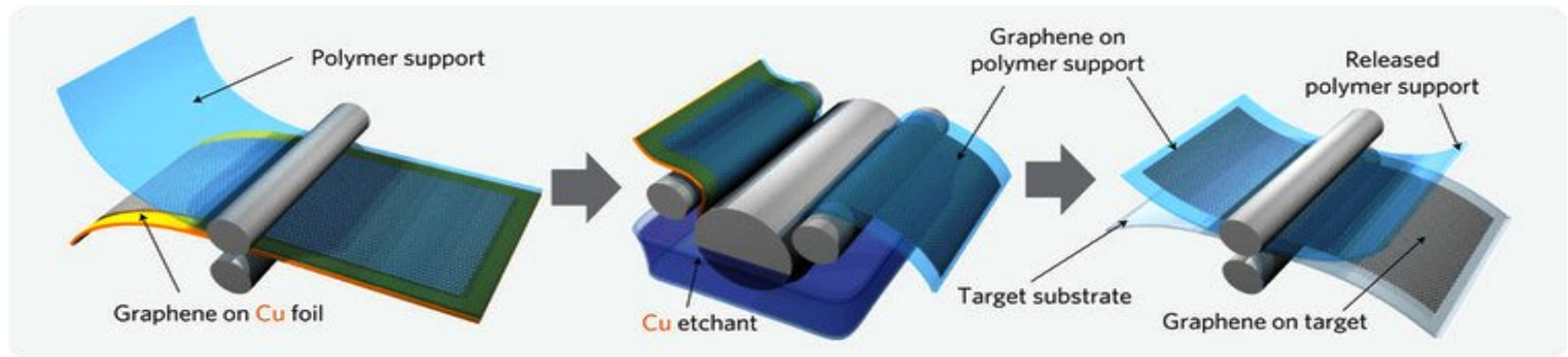
P.W. Sutter et. al., Nature Materials 7, 406 - 411 (2008)

Mobility as high as 20.000

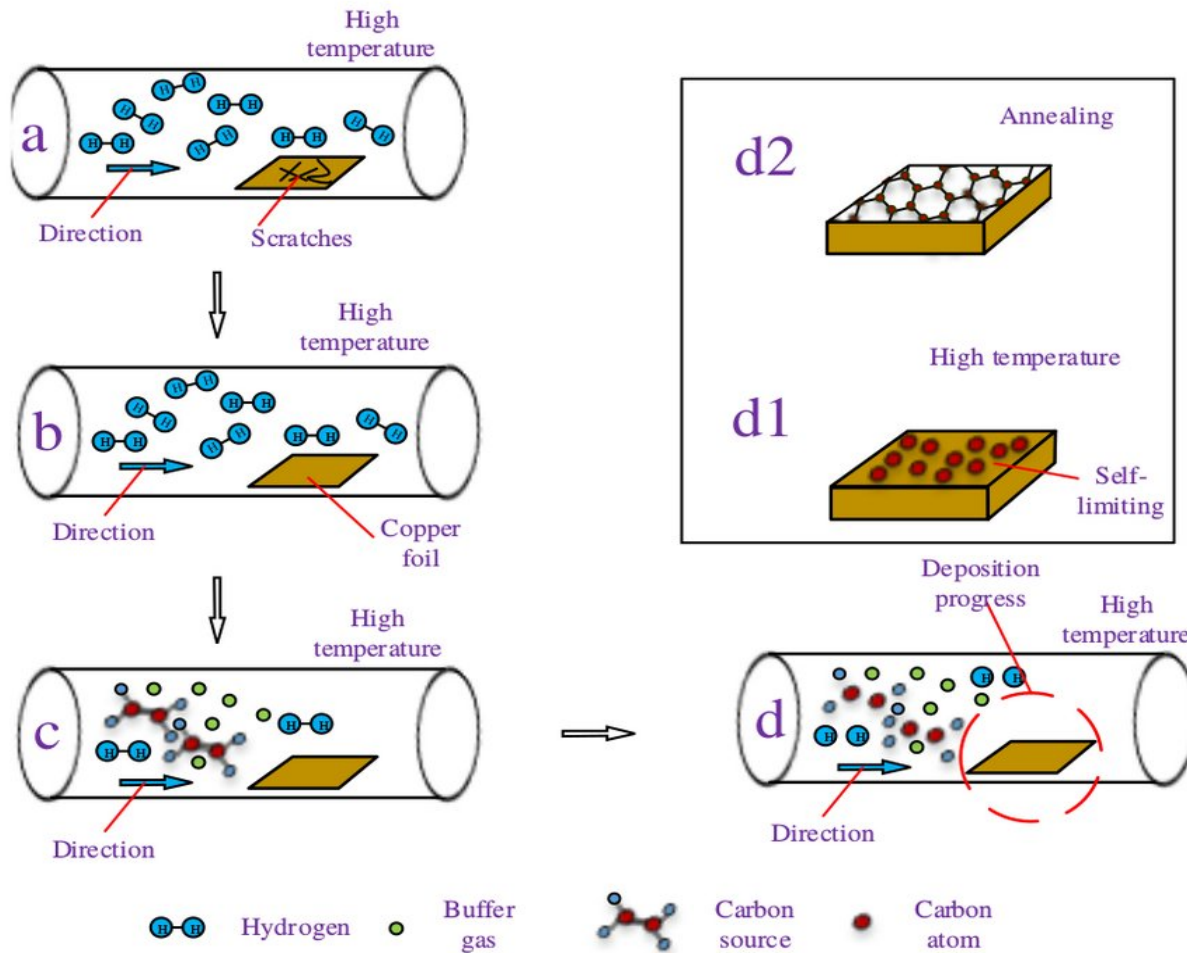
- **Graphene growth by CVD on metals**
- **Monolayer or few layer graphene**
- **Limited in size by substrate area**
- **Temperature ~700 C (CMOS compatible)**
- **Easy transfer to arbitrary substrates**

Ir, Ni, Cu, Pt, Fe

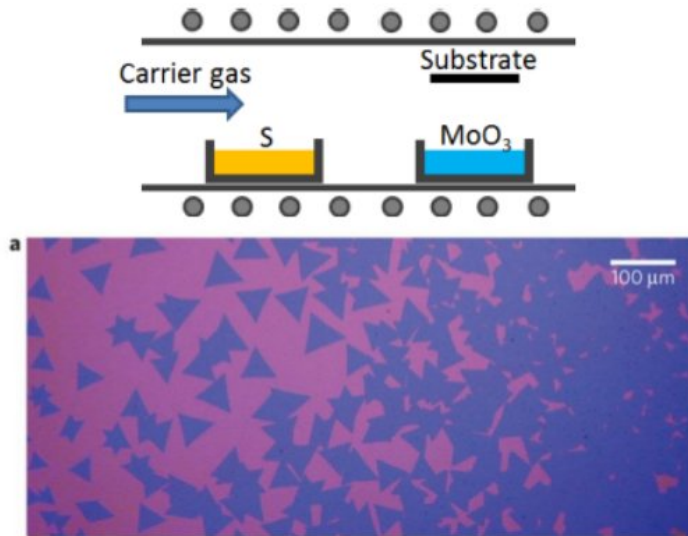
Samsung 30 inch graphene for transparent electrodes



Sukang Bae et al, Nature Nanotechnology Vol.5 ,pp 574–578 (2010)

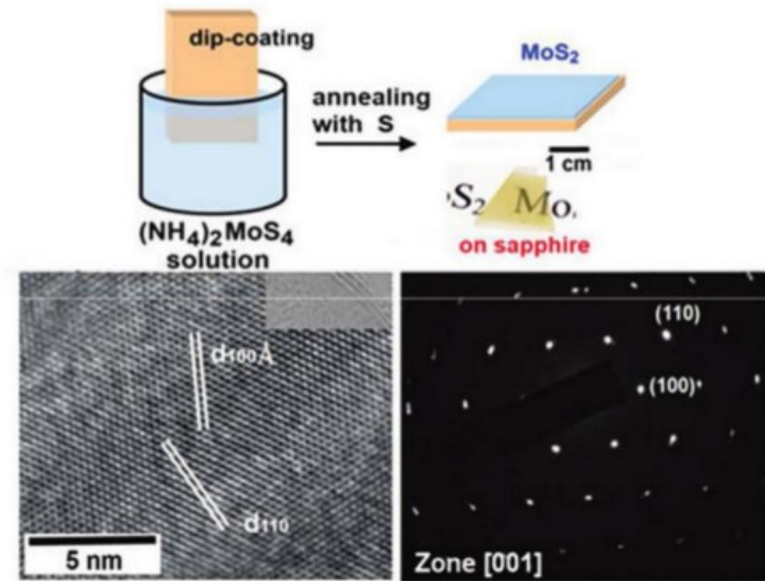


MoS₂ by MoO₃/S CVD at 700°C



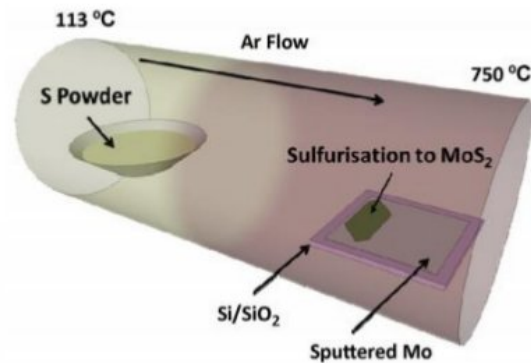
van der Zande et al., Nat. Mater. 12, 554 (2013)

MoS₂ by thermolysis at 1000°C



K. K. Liu et al., Nano Lett. 12, 1538 (2012)

Sulfurization of sputtered metal



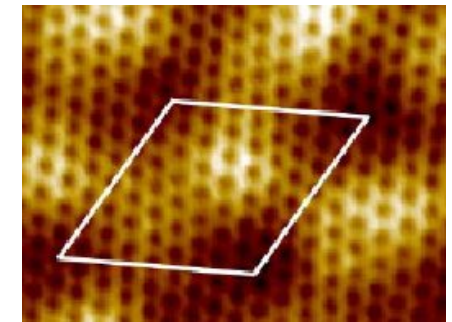
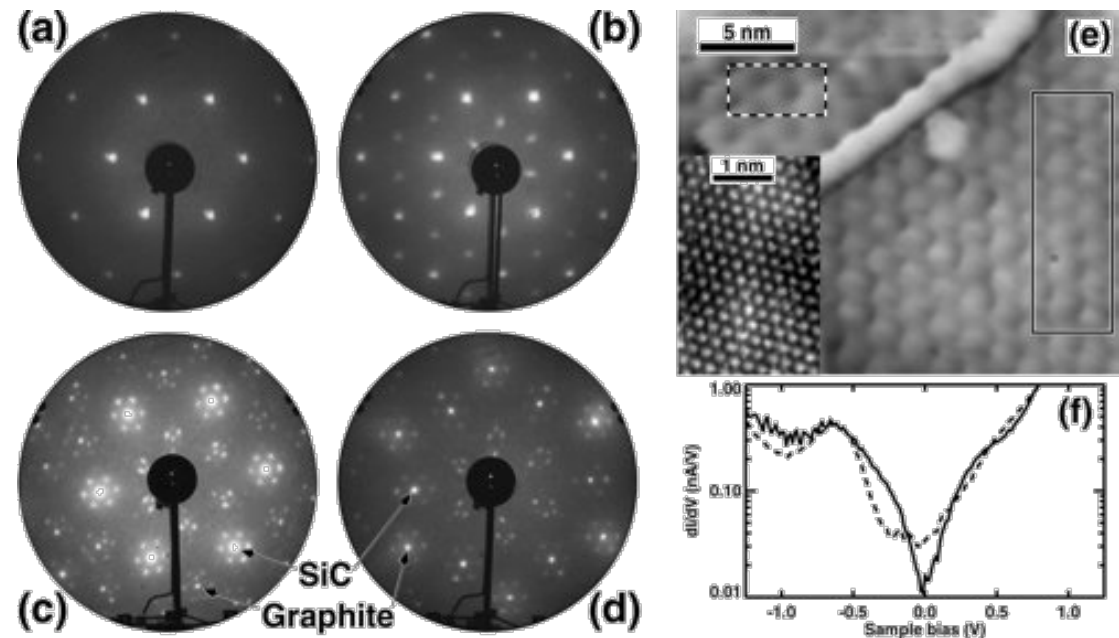
Gatensbv et al., Appl. Surf. Sci. 297, 139 (2014)

Challenge – how to maintain Mo:S = 1:2?

SiC thermal decomposition
Monolayer or few layer graphene
limited in size by substrate area

GeorgiaTech (Walt de Heer) were
working on graphene
Well before 2004!!! But...

Removal from substrate difficult
Mobilities lower than ~5.000
Too high temperatures (>1100 C)



J. Phys. Chem. B, 2004, 108 (52), pp 19912–19916