

Caractérisations de Graphène

Solutions / suspensions

rhéologie

diffusion de la lumière

Spectroscopie d'absorption

Conductivité (solutions de graphenures)

...

composites

?

Dépôts

Microscopie optique

Microscopie à balayage (MEB)

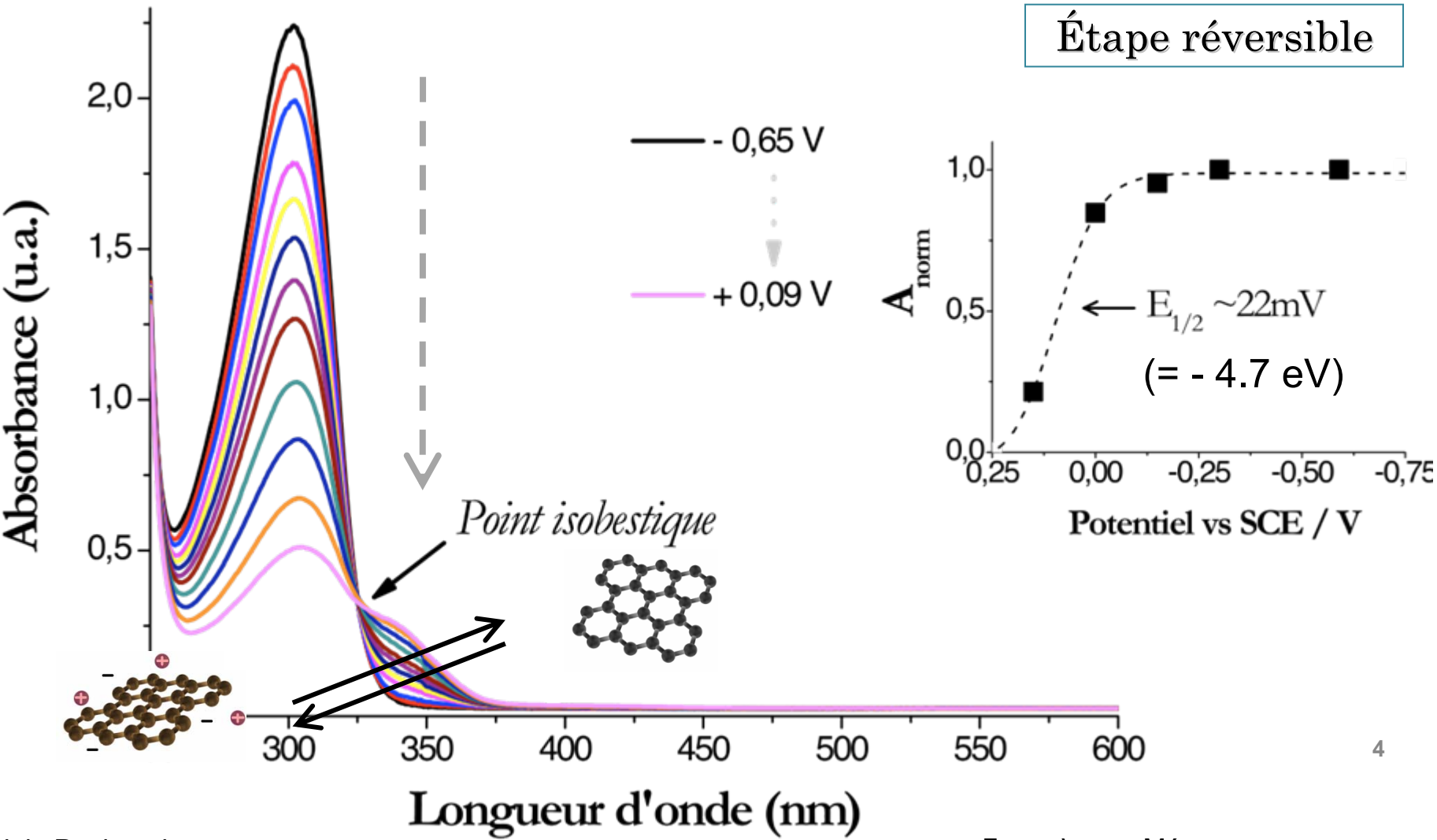
Microscopie à transmission (TEM)

Microscopie à Force Atomique (AFM)

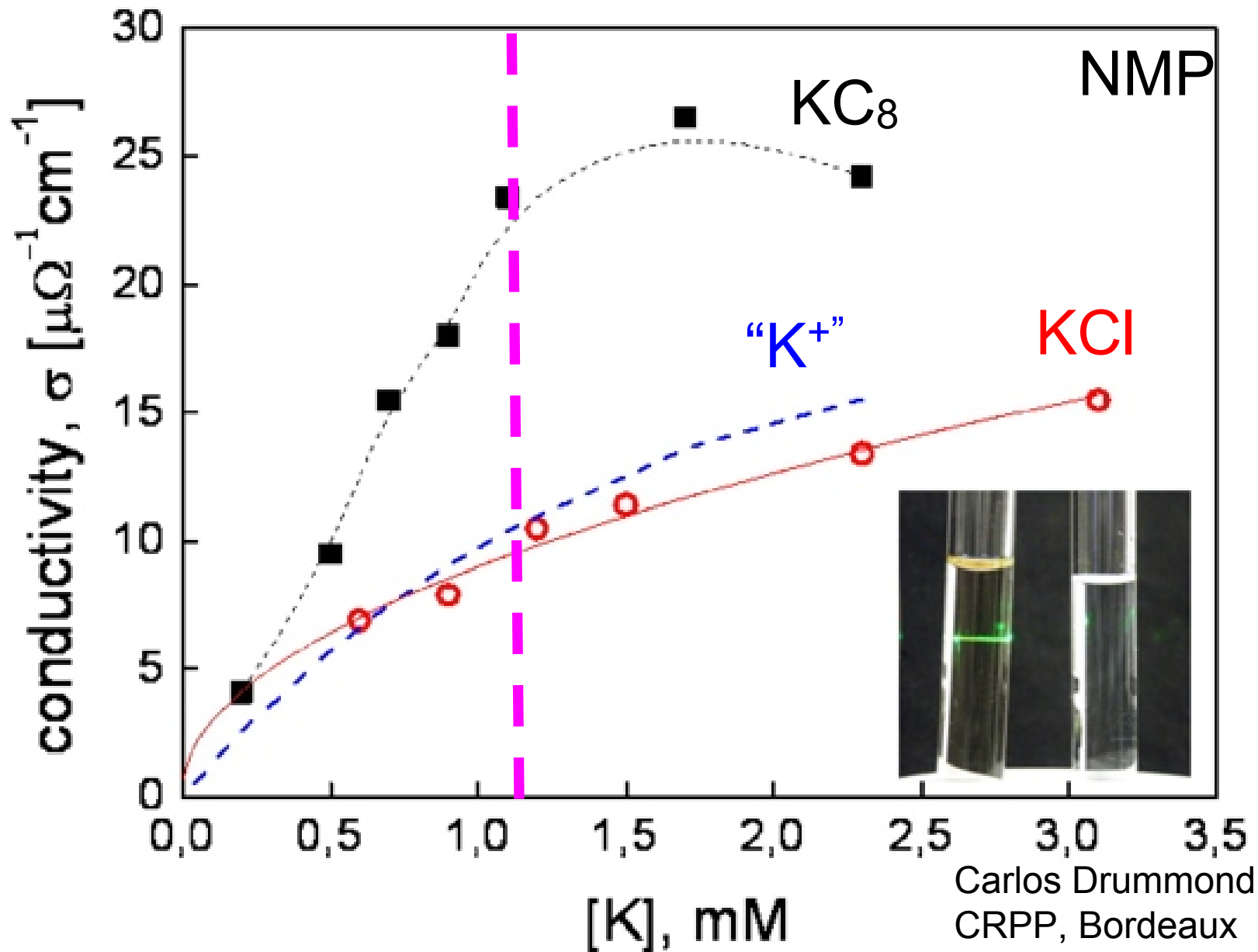
Raman

Spectroscopie de photoelectrons X (XPS)

Spectroelectrochemical analysis : solutions de graphène de potassium

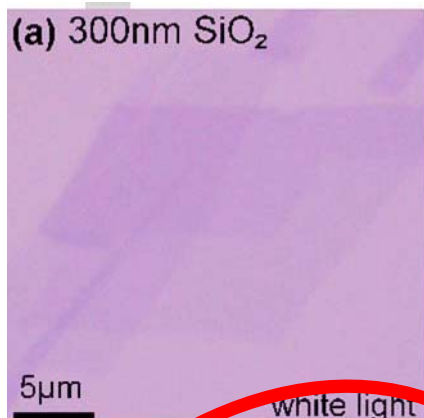


Solutions de graphène de potassium

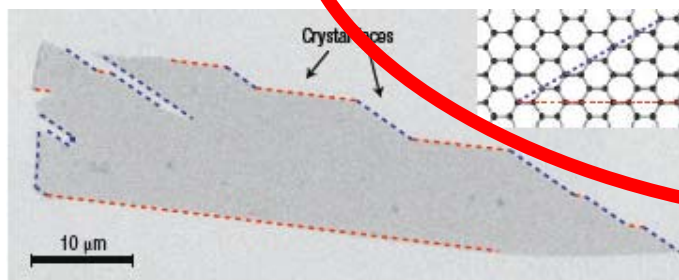


How to characterize "graphene solutions": Analysis of the deposits

Optical microscope

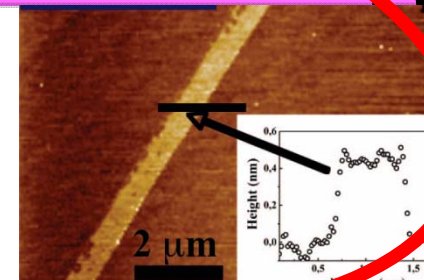


P. Blake et al., App. Phys. Lett. 2007



Geim & Novoselov, Nat. Mater. 2007

Atomic Force Microscopy

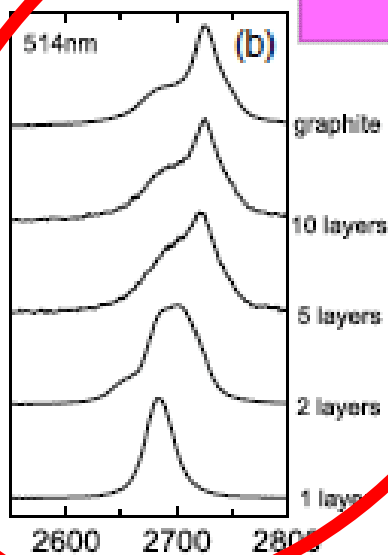


C. Vallés et al. J. Am. Chem. Soc. 2008

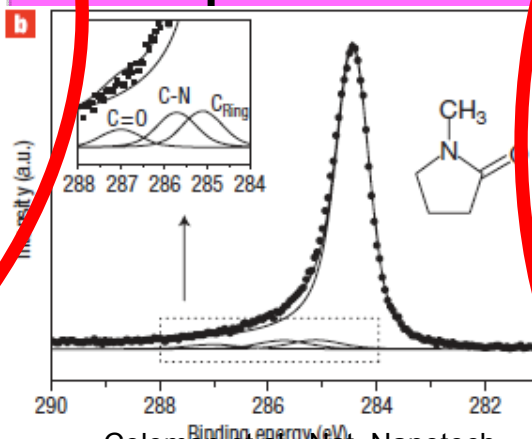
Scanning Electron Microscopy (SEM)

Raman spectroscopy

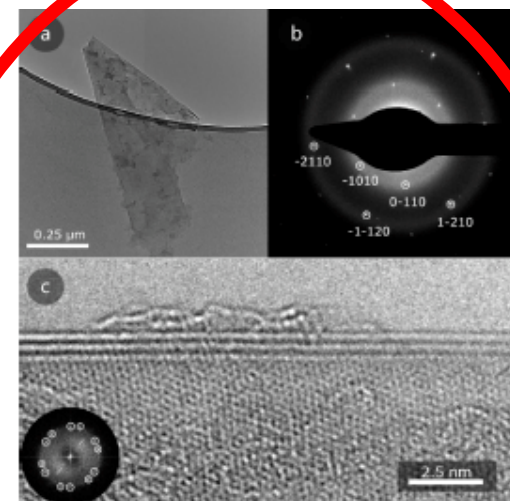
XPS spectroscopy



Ferrari et al., Phys. Rev. Lett. 2006

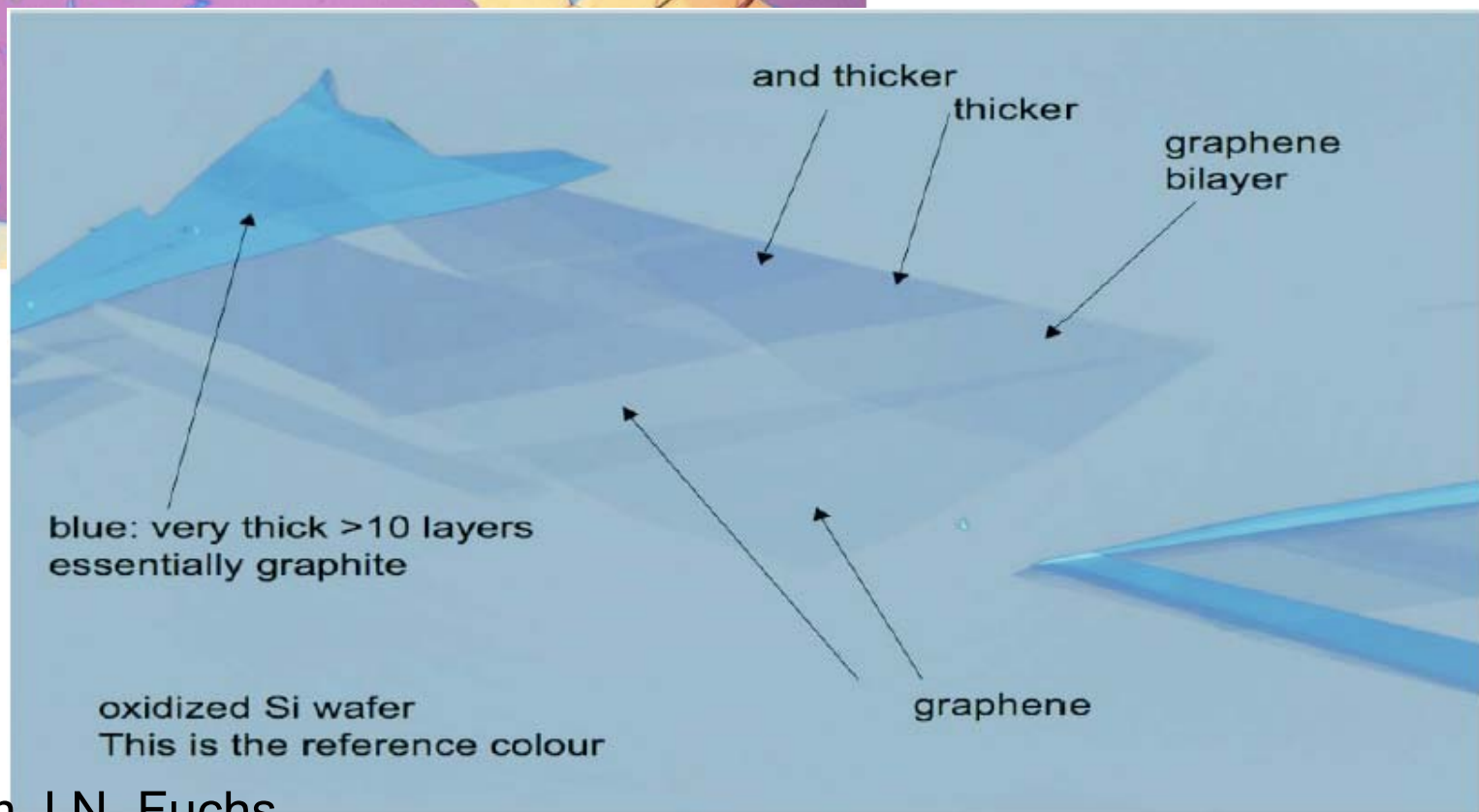
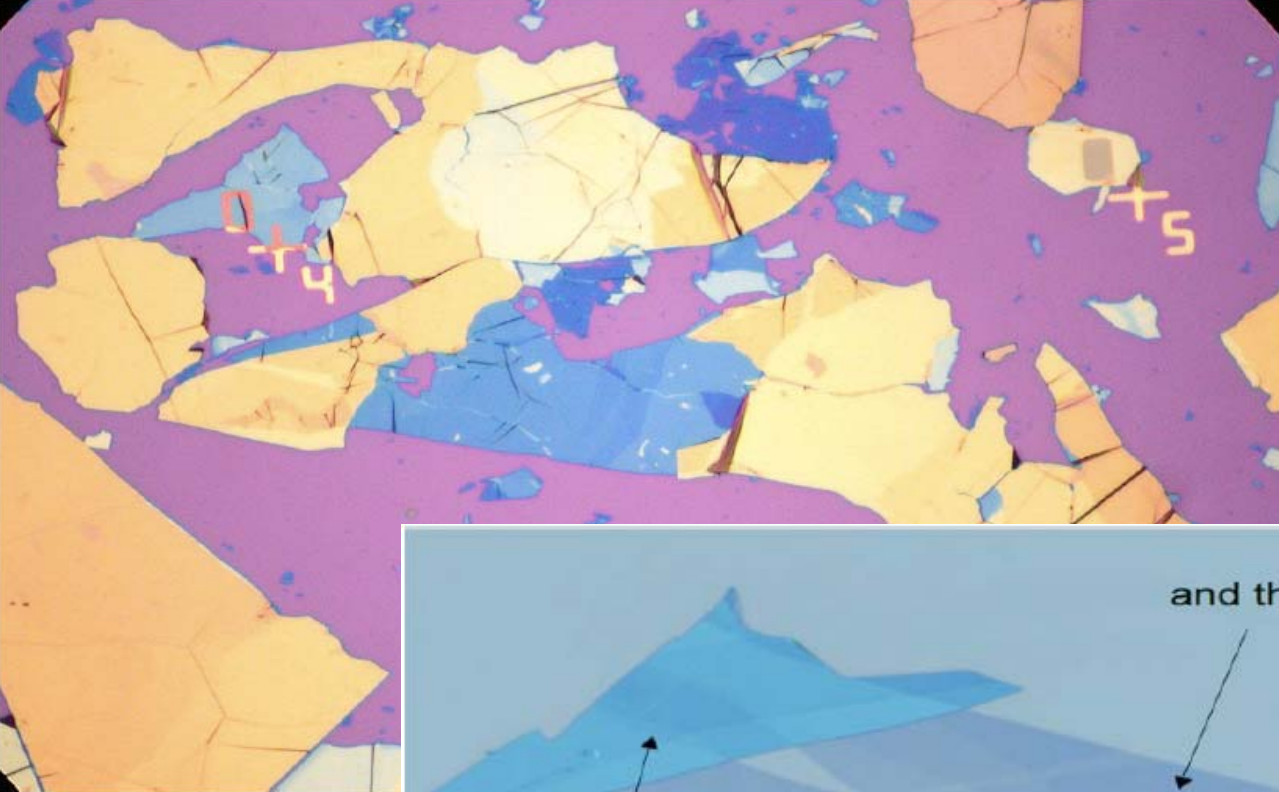


Coleman et al., Nat. Nanotech. 2008



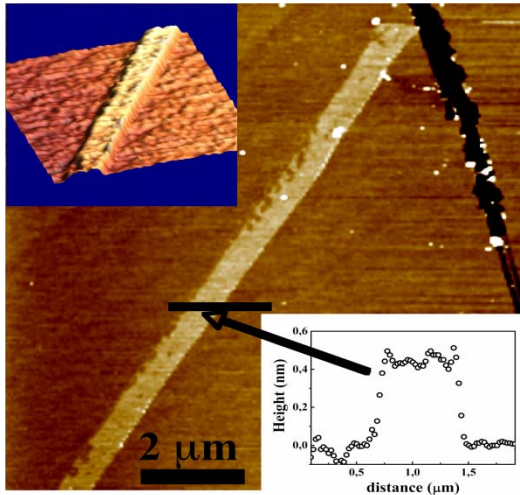
C. Vallés et al. J. Am. Chem. Soc. 2008

(High Resolution) Transmission Electron Microscopy (HR)TEM



slide inspired from J.N. Fuchs

AFM : mesures de hauteur



sur mica
 $h = 0.35 \text{ nm}$

Vallés et al., Jacs 2008

sur wafer de SiO_2 :

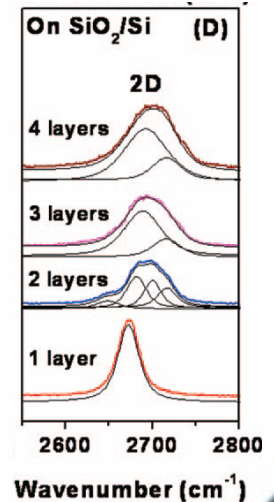
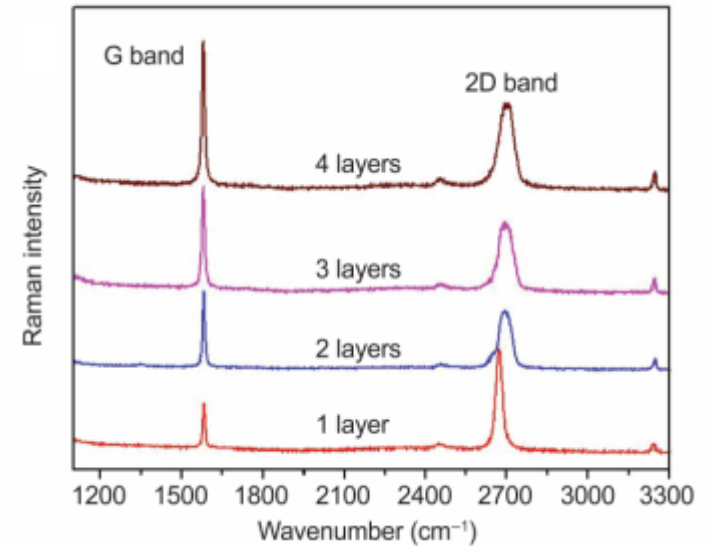
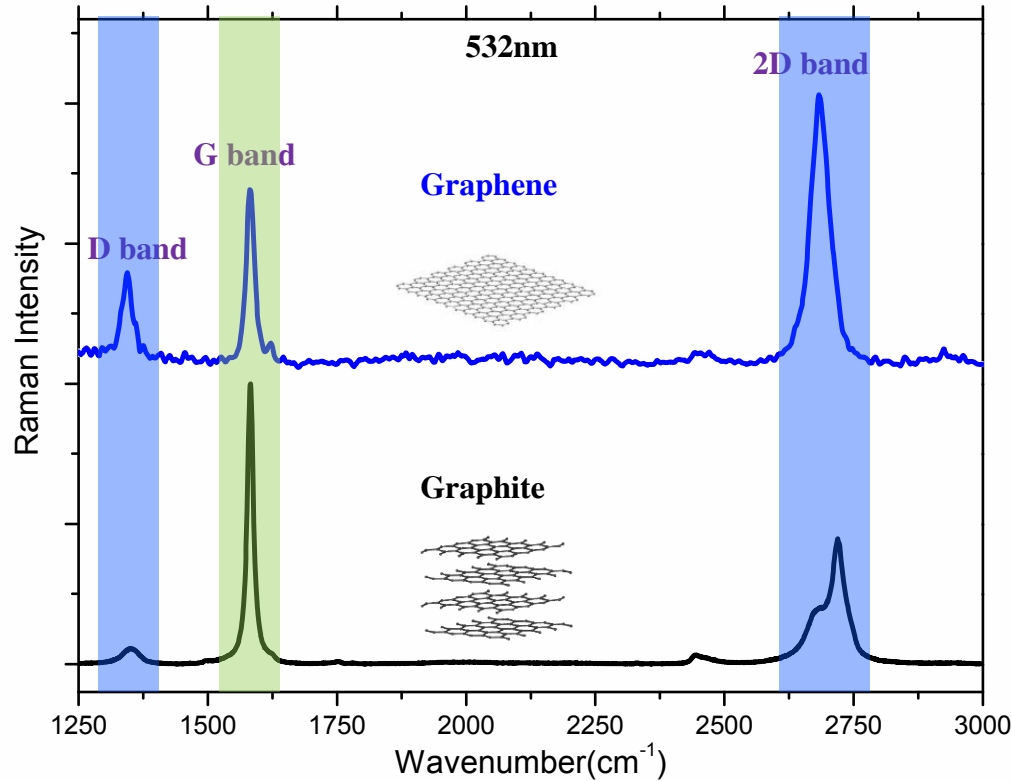
1ère couche = 0.8 à 1.2 nm

Milner et al., Jacs 2012

Raman of Graphene: Generality

Raman spectroscopy

- technology for non-destructive analysis
- Powerful technology for graphitic materials



- G band, 2D band, D band (defects)
- identify number of layers

- WIRTZ et al. NanoLetters. 2007.