Controlled Growth of Graphene Bilayers and Their Chemical and Physical Properties

Minh NGUYEN[a c], Saman CHOUBAK[b c], Vincent AYMONG[a c], Dhan CARDINAL[a c], Pierre L. LEVESQUE[a c], Patrick DESJARDINS[b c], Richard MARTEL[a c]

[a] Université de Montréal, département de chimie, C.P. 6128 Succursale Centre-Ville, Montréal, Québec H3C 3J7, Canada

[b] Polytechnique Montréal, département de génie physique, C.P. 6079 Succursale Centre-Ville, Montréal, Québec H3C 3A7, Canada,

[c] Regroupement Québécois sur les Matériaux de Pointe

e-mail: minh.nguyen@umontreal.ca

Graphene bilayers have many interesting properties that are very different to graphene monolayers (i.e. a tunable bandgap could be introduced to two layers). In this study, we investigate chemical reactivity and optical properties of graphene samples with bilayer domains. For this purpose, we managed to control the growth of bilayers by chemical vapor deposition (CVD). Raman imaging of functionalized graphene shows that bilayers are less grafted, proving that monolayer graphene is more reactive than bilayers. Also, due to a resonance phenomenon, we observe very high intensity G band for bilayers at a critical twist angle. Interestingly, some infrared bands that don't normally appear for monolayer graphene are present with our doped bilayer graphene samples.