

# Effect of copper quality on graphene flakes formation in chemical vapour deposition (CVD)

---

**M. Hadi Khaksaran**<sup>1,2</sup>

Ismet I. Kaya<sup>1,2</sup>

<sup>1</sup>Faculty of Engineering and Natural Sciences, Sabanci University, Istanbul, Turkey.

<sup>2</sup>Nanotechnology Research and Application Center, Sabanci University, Istanbul, Turkey.

[hadikhaksaran@sabanciuniv.edu](mailto:hadikhaksaran@sabanciuniv.edu)

---

Since introducing CVD method for growing graphene on copper till now, there were variety of enhancement in suggested growth mechanisms that explain process flow of growth and hinting further controlling parameters.

However, there are still many challenges in reproducing growth recipe from lab to lab and explaining some of unknown effects, especially when it comes to use of low purity commercial copper foil.

In this work we present our recent experimental results in growth of graphene on copper. We observe some graphene flakes formation during annealing time just under hydrogen gas flow and without introducing any methane gas.

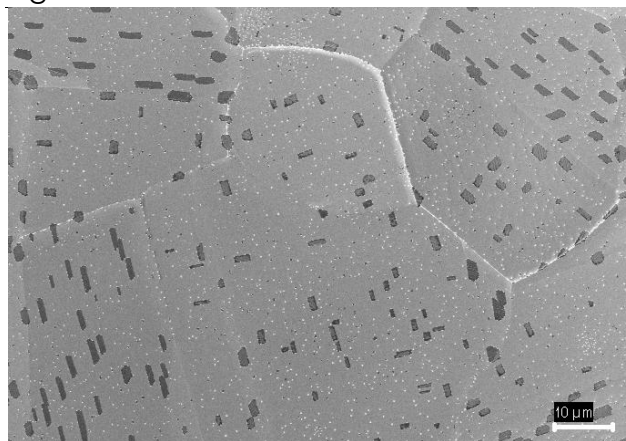
This only could be explained by considering presence of some undesired carbon atoms. We found this effect became more visible when the lower purity copper foil has been used. It seems, carbon atoms have penetrated inside the copper foil, due to presence of oxygen, through the casting process, while normally they cannot dissolve inside high purity copper.

Practically, we found presence of these undesired carbon atoms can be as important as other parameter for nucleation density of graphene crystals.

Additionally we study dependency of early grown undesired graphene flakes to the other CVD parameters.

---

Figures



---

**Figure 1:** Typical SEM image of graphene flakes on copper surface which appear after annealing the copper under hydrogen gas flow at 1000°C.

---