# Copper non-wetting of graphene surfaces

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Recently, there has been growing interest in hybrid graphene-metallic nanostructures that can be used for various applications in photonics and optoelectronics [1,2]. The most commonly used metals for practical applications in photonics include silver, gold, aluminium and copper. In this case, copper is the preferred material in terms of technology as well as the cost of manufacture. Therefore, copper-graphene interfaces attracted recently considerable research attention [3].

Graphene-metal nanostructures can be created by transferring metal to graphene [4] or directly depositing it on graphene. Here, we present the study of optical, electrical and structural properties of thin copper films grown by electron beam evaporation on graphene transferred onto $SiO_2$/Si substrate. We focus on the effect of copper non-wetting of graphene surfaces in case of Cu thin-films. Our results (see Figure 1(a)) clearly demonstrate a significant difference in morphology of copper films on $SiO_2$ without and with graphene, which results in low metallic optical response of Cu films on graphene (see Figure 1(b)). The difference in structural and optical properties should be explained by a weak bond of Cu adatoms to graphene and low diffusion barrier, which results in the high surface mobility of metal atoms and three-dimensional Cu cluster growth on graphene [5]. These factors strongly affect the growth morphology and properties of finite films, in contrast to copper on $SiO_2$ surface without graphene.

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## References

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## Figures

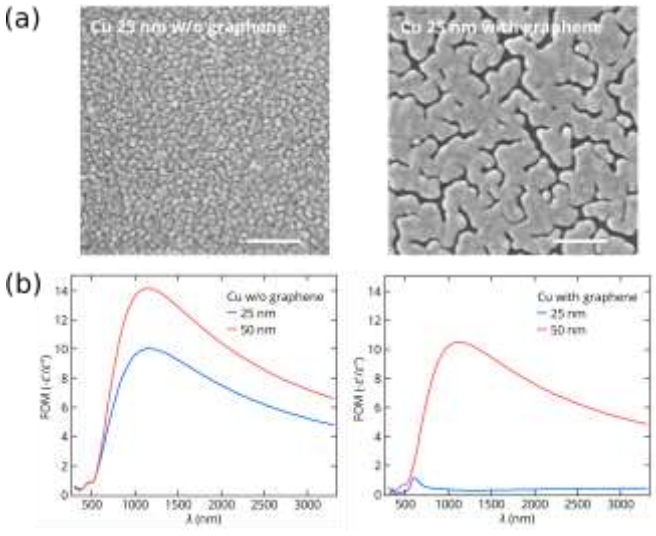


**Figure 1:** (a) SEM images (scale bar = 200 nm) of 25 nm copper films deposited on $SiO_2$/Si substrates with and without graphene. (b) Plasmonic figure of merit (FOM) of copper 25 and 50 nm-thick films determined by ellipsometry measurements.