

# Is graphene really wetting transparent?

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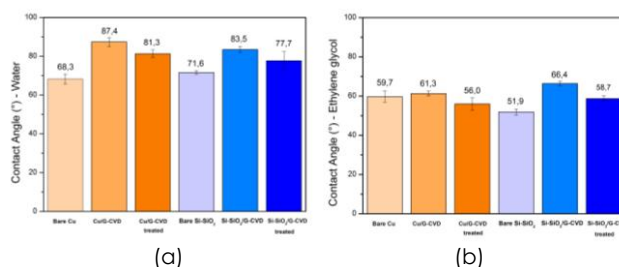
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Graphene has been targeting of several studies due to its excellent properties [1]. However, there is a lack of information about its wetting behaviour and surface free energy (SFE), which are crucial factors to determine compatibility between materials and also enable applications such as conformal coatings, biomaterials, structural composites and electronic devices [2]. Recent studies are contradictory about wetting transparency of graphene. Some authors suggest graphene is completely transparent [3] while others that it is only partially [4]. In this work, we compared the contact angle and SFE values of different substrates: bare copper (Cu), SiO<sub>2</sub>/Si wafer and chemically vapor deposited graphene (G-CVD) on these substrates, as received and after thermal treatment under inert atmosphere. To calculate SFE values we used Fowkes method with two different liquids (deionized water and ethylene glycol). The results point that graphene leads to similar modifications on SFE for different substrates (increase in hydrophobicity, however, the contributions of polar ( $\gamma^p$ ) and dispersive ( $\gamma^d$ ) components depend on the nature of the substrates. Our findings reveal a different conclusion based on literature information, indicating that graphene may not be completely transparent [3] or even partially [4] in substrates where van der Waals interactions

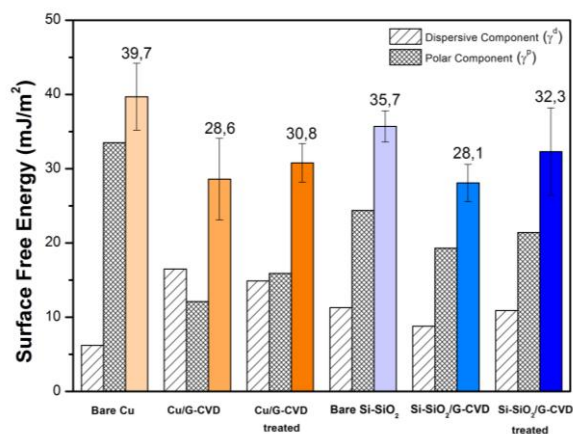
between liquid and solid surface are dominants (Cu).

## References

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**Figure 1:** (a) Water and (b) ethylene glycol contact angle for different materials and treatments.



**Figure 2:** Surface Free Energy for different materials and treatment conditions with its dispersive and polar components indicated.

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