

Description:

Graphene, although marketed and heralded as the supermaterial of choice for many applications, has repeatedly failed to manifest its true transformative game-changer nature in real-life applications. As such, many tech leaders consider graphene to be as doomed as carbon nanotubes by over-promising but under-delivering. The root cause at the heart of this inconsistency, stymying the harnessing of the full potential of this wonder material, now we show, lies in the small traces of silicon-based contaminants that can tragically deteriorate the final device performance altering it useless for industrial applications. Employing circumstantial state-of-the-art electron microscopy, we identified how the 2D property can also act as the Achille's heel for graphene further emphasizing on the use of excessively pure graphite, if graphene is ever going to be billed as the back-bone of next-generation device technology. As an example, using the pure source for the preparation of graphene-based devices led us to attain an unmatched level of performance in humidity sensor technology. Furthermore, we could achieve a milestone in supercapacitor properties by almost reaching the theoretical capacitance value of graphene. The findings presented in the paper will help integrate this fascinating material in commercial mass production rather than being stucked in the development stage, forever.

“Silicon as a ubiquitous contaminant in graphene derivatives with significant impact on device performance” Nature Communications volume **9**, Article number: 5070 (2018)

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