

Graphene for MEMS sensor products: Chances and challenges

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Abstract:

Graphene, the 2D material with very promising mechanical and electrical properties has now reached a level of maturity where an industrial engagement is necessary on the way to commercialization. Bosch the worldwide largest manufacturer of MEMS sensing devices is now a part of the growing number of companies and startups looking into graphene applications and large scale fabrication routes for graphene synthesis.

In terms of wafer based fabrication there is still a need for improvement of the commonly used graphene synthesis process based on layer transfer techniques including wet processing. An overview of possible methods and current progress in this field will be covered in our presentation.

In terms of applications Bosch corporate research has started first collaborations with the academia to evaluate the potential of graphene for sensor applications.

Here, Bosch currently focuses on magnetic sensing. The two-dimensional material graphene exhibiting substantially higher charge carrier mobility seems to be predestined for use in magnetic field sensing. Neglecting all extrinsic sources of disorder, the phonon scattering limited mobility of graphene can surpass 100,000 cm²/Vs at room temperature at a reasonably low charge carrier density of 10¹² cm⁻², exceeding all other common material candidates for Hall sensing.