Graphene for NEMS Devices

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Abstract

Graphene has exiting potential in nanoelectromechanical system (NEMS) applications due to its ultimate thinness in combination with its mechanical stability and interesting electrical properties. In this presentation we will discuss the potential of using suspended graphene structures in NEMS sensors and provide an overview of graphene NEMS sensors demonstrated in literature, including different types of graphene pressure sensors, resonators, and accelerometers [1-4]. We discuss suitable transduction mechanisms that are relevant for use in NEMS sensors, including piezoresistive and resonant transduction. We also discuss key graphene integration and fabrication technologies for graphene NEMS sensors that are compatible with standard CMOS integrated circuit wafers and with the existing semiconductor manufacturing infrastructure [5]. In summary, graphene has great potential as structural and transducer material in NEMS sensors featuring ultra-small size and competitive sensitivities.

References

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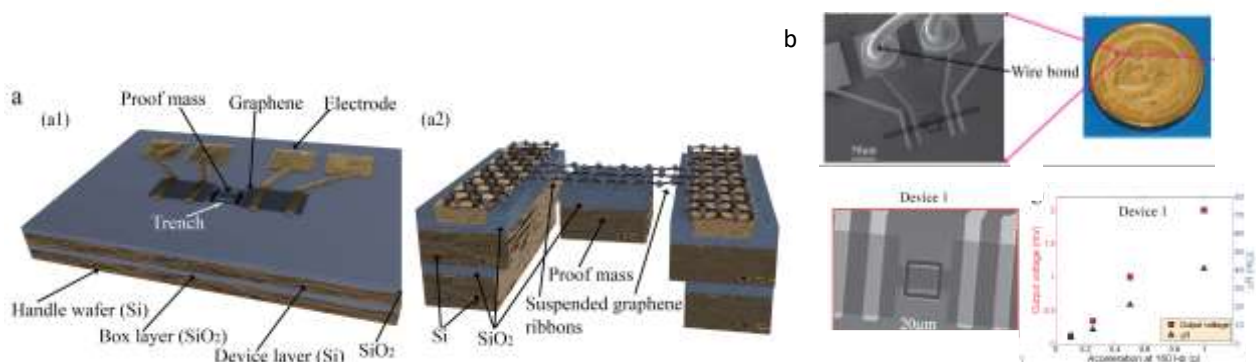
Figures

Figure 1. A graphene NEMS accelerometer. (a) Schematic of the graphene ribbon accelerometer. (b) SEM and optical images of graphene accelerometer and the output signal of a graphene ribbon accelerometer. [3]