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## Sputtering onto Graphene without Introducing Defects

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The impact of energetic particles during sputter deposition can severely damage two dimensional materials systems, such as graphene. Energetic particle bombardment may introduce defects to these structures which will deteriorate their properties. The challenges associated with sputtering onto graphene without introducing defects are demonstrated in this work. The defect formation mechanisms in graphene exposed to different kinetic energies of particle bombardment are disclosed and explained. This was accomplished using an ion gun producing Ar ions at energies in the range from a few eV up to 200 eV. Results from such study was used to tailor make a sputter deposition process that was compatible with graphene. By choosing the correct processing parameters, it is possible to significantly reduce the impact from kinetic particle bombardment and sputter deposit films onto graphene without introducing defects. A correlation between the simulated kinetic energy of the particles hitting the graphene and the level of defects in the graphene is shown. Further, during reactive sputtering of oxides onto graphene, unwanted side reaction such as oxidation of the graphene has been shown to be problematic. The problems with oxide depositions in a sputtering environment have been investigated and strategies to circumvent these have been evaluated.

### Keywords

sputtering  
graphene  
defects  
ion bombardment