Mapping strain fields in graphene by Raman spectroscopy

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Graphene is often portrayed as the "ultimate conductor", thanks to its flexibility and to its excellent conductivity. However, it has been shown that the electrical and the structural quality of graphene are intimately connected, and that nanoscale lattice deformations or local strain fields caused by surface corrugations are a major factor that limits the mobility of electrons in graphene [1]. The flatness of the graphene sheet is therefore a key control characteristic for the fabrication of high-quality graphene layers for electronic devices – and the possibility of measuring it with a simple and fast method is a major technological advantage.
We show that confocal Raman spectroscopy mapping allows to obtain unambiguous information on the amount of nanometer-scale strain variations in a graphene sheet, i.e. on its flatness [2, 3] and allows to map strain fields in graphene. Finally, we will present graphene-based electromechanical systems where the strain-fields can be tuned in-situ [4].

References

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Figures

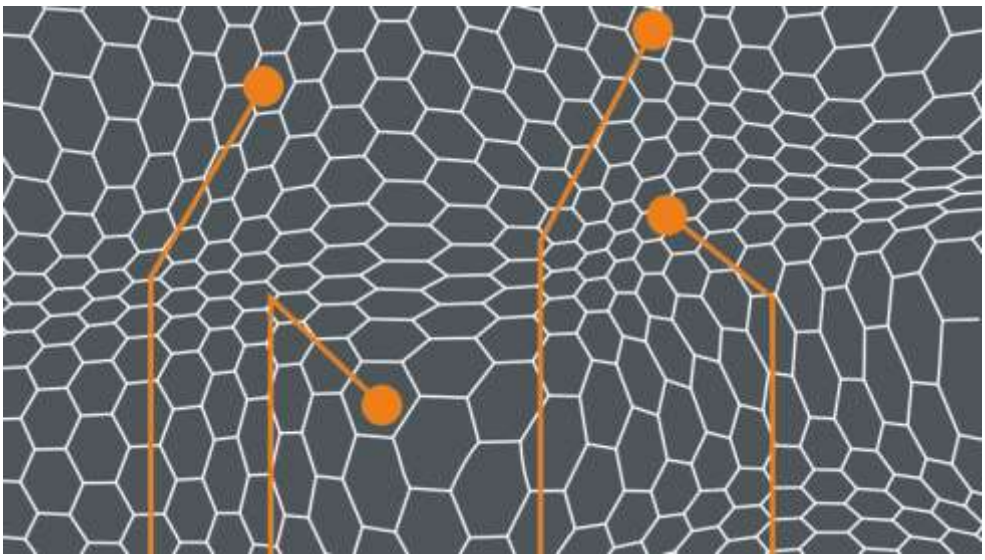

Figure 1: Schematic representation of what corrugations and strain fluctuation might look like in graphene.