Single and few layer graphene flakes under uniaxial deformation

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Graphene is an amazing material exhibiting among the others superior mechanical properties such as extreme stiffness of about 1 TPa and breaking strength of 42 Nm^{-1} (or 130 GPa considering the thickness of graphene as 0.335 nm) [1,2]. Recently there has been a growing interest in bilayer, trilayer and few layer graphene materials because of their interesting properties. In these systems the electronic, optical and vibrational properties are distinct from those of single-layer graphene and strongly depended on the crystallographic stacking of the individual graphene layers] [3].

Raman spectroscopy has been proven a very successful technique to investigate the effect of mechanical deformation on graphene materials under uniaxial tension and compression [4, 5] or hydrostatic pressure [6]. Therefore, monitoring optical phonons it seems the clearest and simplest way to quantify the macroscopic stress/strain imparted to graphene sheets.

In this work, recent results on the uniaxial Raman response of single-, bi-, tri- and few-layer graphene samples will be discussed. Emphasis should be given on the perspectives in the design of graphene based nanocomposites and flexible electronics.

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