A graphene touch panel display: The mechanical effect

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Abstract

Polymer based touch panel displays using transparent conductive films from carbon nanotubes and graphene are considered as key components in new-age optoelectronics such as in flexible, stretchable and wearable devices[1]. In touch panels, the forces exercised by the operator's finger or commercial styluses transmit bending stresses, as well as dynamic contact stresses during lifetime operation. In this work, the mechanical performance of a prototype graphene based touch panel display is investigated (a) under quasi static tensile loading conditions and (b) under dynamic loading at various frequencies and temperature ranges. The display (fig. 1a) consisted of two individual layers of CVD graphene embedded into PET films and supplied by BGT Materials.

It has been found[2], that the deposition of CVD graphene onto PET films results in a specific wrinkling pattern, where wrinkles form individual domains ("islands") of flat graphene. The role of this pattern on the mechanism of stress transfer in the examined touch panel display is investigated by means of Raman spectroscopy[3] (fig.1b). Thermo-mechanical tests resembling real-life operation in terms of frequency and temperature revealed that the display is mechanically robust. The outcome of this work may have important implications in the fabrication of next generation flexible touch panel displays.

References

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Figures

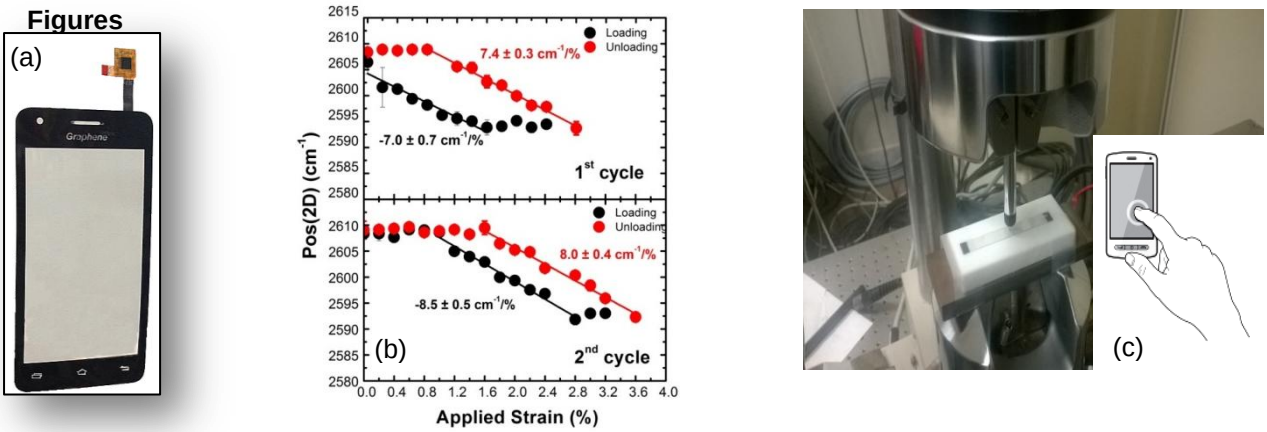

Figure 1: *(a) A prototype graphene based display, (b) Pos(2D) as a function of uniaxial strain for two deformation cycles in quasi static tensile tests, and (c) Simulating the stylus force in a dynamic loading test.*