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Introduction

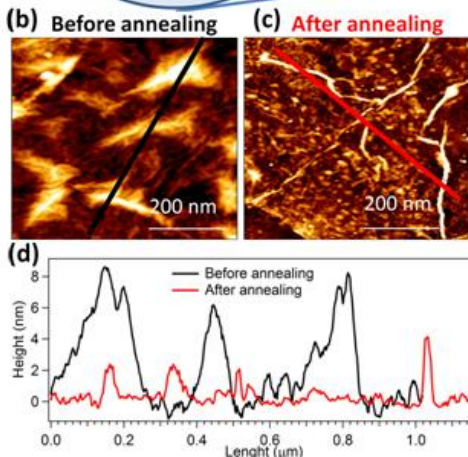
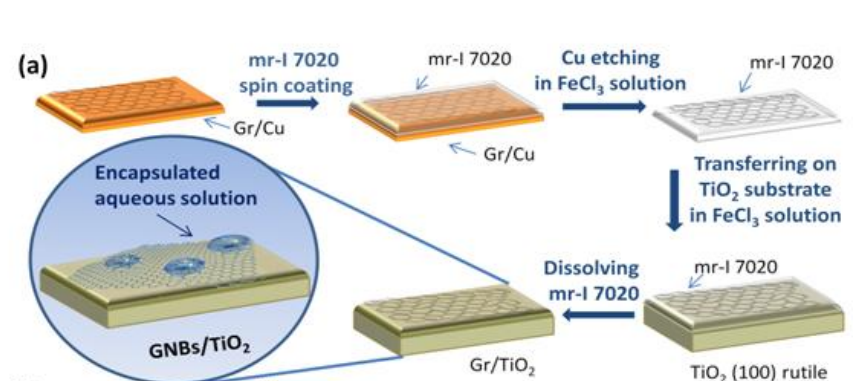
TeraHertz (THz) is a **non-ionizing**, and thus **safe**, radiation, attracting a growing interest for its potentiality of non-destructive chemical **imaging** and **sensing**. Its application was hindered in the past for a dramatical **lack** of THz sources and detectors. New technological approaches emerged in the field of THz sources,

BUT

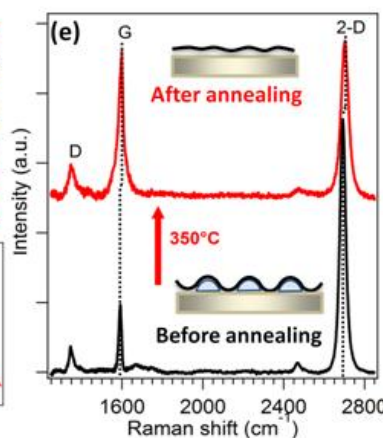
THz detector still rely on older approaches

The Idea/Concept

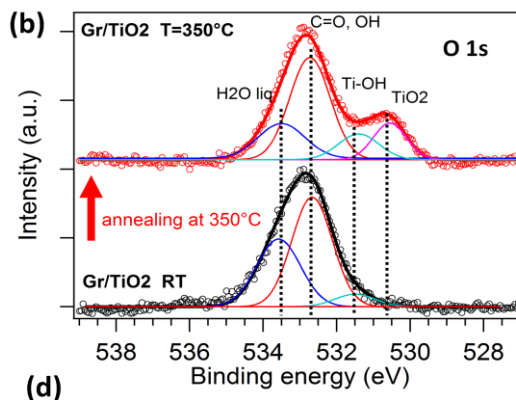
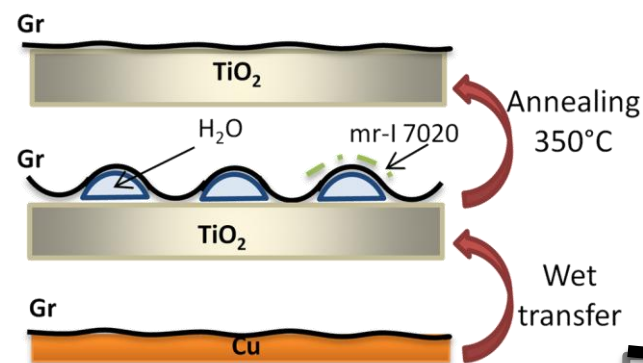
Graphene nanobubbles (GNB) can be created to encase water or other solvents on nanometer scale. The idea is to fabricate arrays of graphene based Golay cells for THz radiation detection.



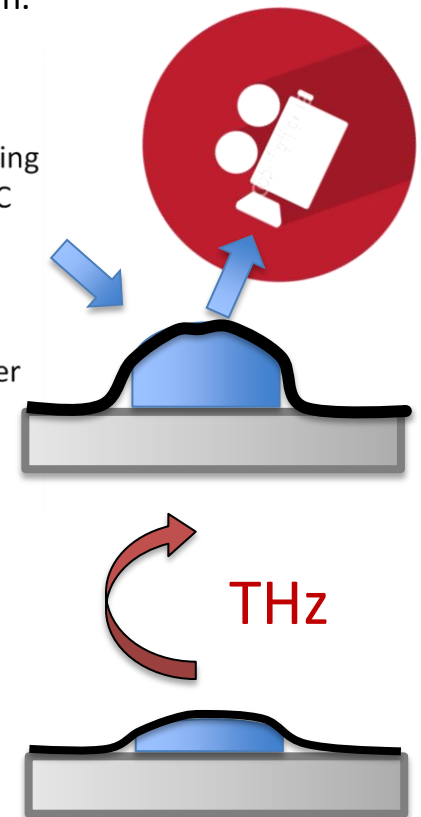
AFM imaging shows the formation of GNB on TiO₂ substrates. GNB are stable in temperature up to 350°C



Raman spectroscopy shows a change in graphene stress, indicating a change in the GNB shape



X-ray photoemission spectroscopy shows the presence of liquid water inside the GNB, which is partially removed with 1h annealing at 350°C



Water absorbs efficiently THz radiation, with a consequent increase in water temperature which is reflected in a change in GNB curvature, as for Golay cells

Potential Impact

Assembling GNB in regular arrays and filling them with water solutions absorbing at different wavelength, just like color CCD are made color-filtering the nearest neighbors pixels, we aim at producing a “color sensitive” THz imaging detector. The development of imaging technology in the THz spectral range will foster THz technology in a way comparable to that experienced by optical imaging in almost all the scientific and technological applications (from biology to astronomy, from security to consumer) with the invention of CCDs.