Van der Waals hybrid structures: 1T-TaS_2/graphene and Bi_2Se_3/graphene systems

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The 2D materials joined together in layered structures only by Van der Waals interactions can produce a new system with unique properties. Numerous such heterostructures are now considered for application in electronics, spintronic and photonics. This is related with the fact, that the combination of two materials can lead to structural properties which are not simply a sum of the properties of components. The nanoscale interaction can modify the electronic structure of materials and produce a completely new hybrid material with exceptional functionality.
However, nowadays the challenge in construction of new materials seems to lie in the wide understanding of properties of components and their qualities at nanoscale. This is especially important considering 2D layers.
Two different hybrid systems will be presented: 1T-TaS_2/graphene and Bi_2Se_3/graphene. For both the characterisation of all components will be shown. This allows for understanding of the properties of the layers before they were joined together and compare them with hybrid structures. The materials will be characterised with low energy electron diffraction, x-ray photoelectron spectroscopy, atomic force microscopy and scanning tunnelling microscopy techniques.

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References

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Figures

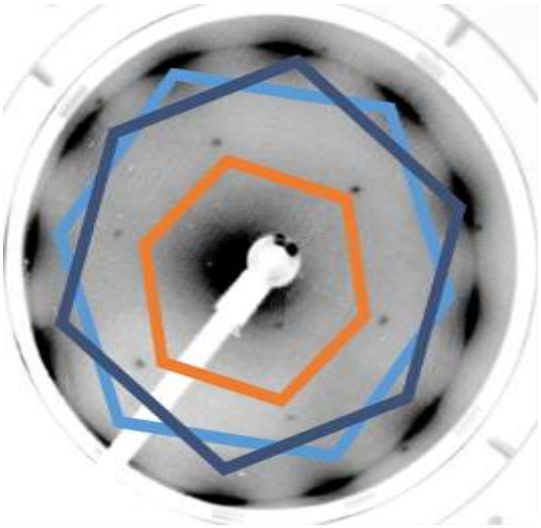

Figure 1: The LEED pattern of graphene/Bi_2Se_3 hybrid structure