

## **Imaging and Characterisation of the Biology- Graphene Interface**

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A wide variety of applications of graphene and graphene oxide are in active development including both bulk applications, and those implying biological or environmental contact such as water purification and spray coated touch sensitive panels. Therefore, graphene, as potential hazards must be assessed, before their production and use is spread more widely. Understanding how few and multilayer graphene interacts with cell membranes at cell-graphene interface, is related to how this material causes cell damage and is therefore critical for designing safer materials. The direct observation of cellular uptake of graphene at the level of the individual graphene layers has not been demonstrated due to difficulties in discriminating between the number of layers, their orientation and carbon-rich cell structures. I will present data showing how high resolution transmission electron microscopy, electron energy loss spectroscopy and confocal microscopy can be used to image the interaction of multilayer graphene with cell organelles at different length scales. The potential and limitations of using nanoanalytical techniques to image few layer graphene in the cellular environment will be described, alongside the benefits of using these methods to predict the biohazards of 2D nanomaterials to human health and the environment.