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## CARBON ELECTRODE-MOLECULE JUNCTIONS: A RELIABLE PLATFORM FOR MOLECULAR ELECTRONICS

**Xuefeng Guo**

Peking University, P R China

This talk will exemplify our on-going interest and great effort in developing efficient lithographic methodologies capable of creating molecular electronic devices through the combination of top-down micro/nanofabrication with bottom-up molecular assembly. These devices use nanogapped carbon nanomaterials (such as single-walled carbon nanotubes (SWCNTs) and graphene) as point contacts formed by electron beam lithography and precise oxygen plasma etching. Through robust amide linkages, functional molecular bridges terminated with diamine moieties are covalently wired into the carboxylic acid-functionalized nanogaps

to form stable carbon electrode-molecule junctions with desired functionalities. We have used these approaches to reveal the dependence of the charge transport of individual metallo-DNA duplexes on  $\pi$ -stacking integrity, and fabricate molecular devices capable of realizing label-free, real-time electrical detection of biological interactions at the single-event level, or switching their molecular conductance upon exposure to external stimuli, such as ion, pH and light.

guoxf@pku.edu.cn