**Zwitterionic Graphene Sheets with the Switchable Bacterial Interactions**

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**Abstract**

Graphene, a single-atom thick and 2D surface with unprecedented physicochemical properties and extremely high aspect ratio raised enormous interest for biomedical applications and in particular detection, inhibition and killing different types of pathogens[1,2].

However, study and control over the interactions between graphene derivatives and biological surfaces is challenging, due to their "polydispersity" and "undefined functionality"[3]. Since functionalization improves even the "polydispersity" and other structural parameters of graphene dramatically, it is the key step to process pristine graphene toward a well-defined surface with predictable interactions in nano-biointerfaces.

In this work graphene sheets have been functionalized and postfunctionalized by a new method using [2+1] cycloaddition reaction at ambient condition controllably. Zwitterionic graphene sheets with well-defined surface structure in terms of polymer coverage and functional groups were synthesized and their interaction with *E-coli* was investigated. It was found that electrostatic interactions are the main driving force for adhering bacteria to the surface of ZGS and antibacterial activity of these 2D nanomaterials could be switched "off" and "on" by a minor shift from their isoelectric point (PI).

**References**

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