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Title: Loading of an anti-cancer drug onto graphene oxide and subsequent release to DNA/RNA: a direct optical detection

Authors: Koninti, R.K. (/jspui/browse?type=author&value=Koninti%2C+R.K.)
Sengupta, A. (/jspui/browse?type=author&value=Sengupta%2C+A.)
Gavvala, K. (/jspui/browse?type=author&value=Gavvala%2C+K.)
Ballav, N. (/jspui/browse?type=author&value=Ballav%2C+N.)
Hazra, P. (/jspui/browse?type=author&value=Hazra%2C+P.)

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Abstract: Graphene oxide based molecular switching of ellipticine (E) has been utilized to probe its efficient loading onto graphene oxide (GO) and subsequent release to intra-cellular biomolecules like DNA/RNA. The green fluorescence of E switches to blue in GO and switches back to green with polynucleotides. The intensified blue emission of the ellipticine-GO (E-GO) complex with human serum albumin (HSA), switches to a bluish green upon addition of dsDNA. Electron microscopy reveals the formation of distinctive 3D assemblies involving GO and biomolecule(s) probably through non-covalent interactions and this is primarily responsible for the biomolecule(s) assisted fluorescence-switching of E. To our knowledge, such morphological patterning of a GO-DNA complex is very unusual, reported here the first time and could find applications in the fabrication of biomedical devices. Moreover, our approach of direct optical detection of drug loading and releasing is very cheap, appealing and will be useful for clinical trial experiments once the cytotoxicity of GO is duly taken care.

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