A Graphene Oxide-Organic Dye Ionic Complex with DNA-Sensing and Optical-Limiting Properties

Balapanuru J, Yang JX, Xiao S, Kian Ping Loh*

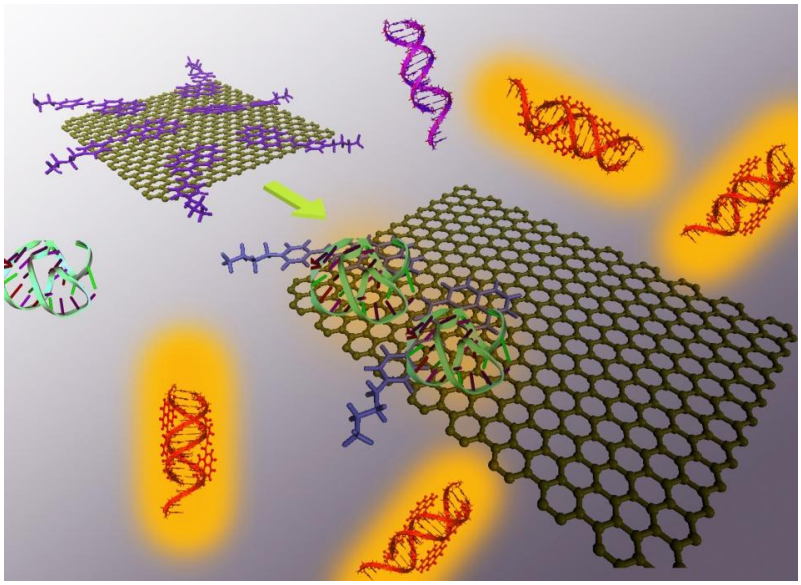
ANGEWANDTE CHEMIE-INTERNATIONAL EDITION, 49 6549-6553, 2010

This paper has been highlighted in NPG Asia Materials website, http://www.natureasia.com/asia-materials/highlight.php?id=788.

Kian Ping Loh's team designed a fluorescent dye called PNPB which can attach in a parallel fashion to graphene oxide. The interactions between these two compounds create a charge-transfer complex that quenches the PNPB dye's fluorescence, leading to new applications in both biological sensing and optical safety.

"This design allows us to perform optical sensing, where the fluorescence of PNPB is switched on or off depending on whether it complexes more strongly with graphene oxide or other biomolecules."

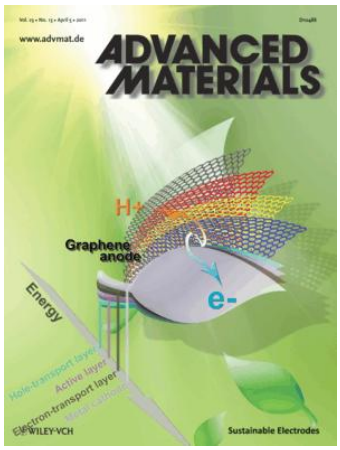
They studied how the complex responded to the primary constituents of blood serum: DNA, RNA, proteins and glucose molecules. We found that the sensor was extremely selective towards DNA even in the presence of RNA and proteins. DNA could be detected fluorescently with parts-per-million accuracy. It turns out that only DNA has the ionic strength capable of separating the PNPB dye from the graphene oxide sheets and thus activating its fluorescence, making this non-toxic complex ideal for applications like identifying contaminant DNA in recombinant proteins.

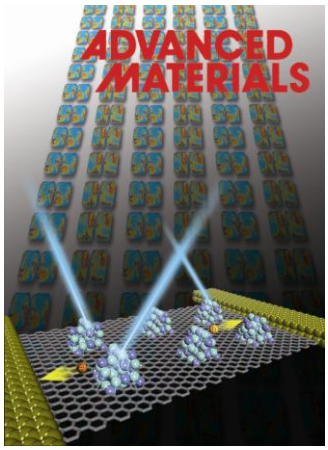


Loh Kian Ping's paper "High Mobility, Printable, and Solution-Processed Graphene Electronics" was one of the top 20 most-accessed articles in *Nano Letters* over the last 12 months in 2010. Nanoletters invite us to create a video discussing the main points of our paper

The virtual video issue for the 2010 Most-Accessed Articles in *ACS Nano* and *Nano Letters* has been released at http://pubs.acs.org/page/vi/2011/nano-video.html.

Other relevant publications in the area of graphene which are highlighted as cover page in *Advanced Materials*





Interface Engineering of Layer-by-Layer Stacked Graphene Anodes for High-Performance Organic Solar Cells

Wang Y, Tong SW, Xu XF, O. Barbaros, Kian Ping Loh*

ADVANCED MATERIALS, 23, 1514-1518 (2011) EDITOR SELECTED COVER PAGE

High-Gain Graphene-Titanium Oxide Photoconductor Made from Inkjet Printable Ionic Solution

Manga KK, Wang S, Jaiswal M, Kian Ping Loh* EDITOR SELECTED COVER PAGE

ADVANCED MATERIALS, 22 5265-5270 (2010)

Structure-Directing Role of Graphene in the Synthesis of Metal-Organic Framework Nanowire

Jahan M, Bao QL, Yang JX, Kian Ping Loh* et al.

JOURNAL OF THE AMERICAN CHEMICAL SOCIETY, 132 (14487-14495) 2010

Graphene-Based SELDI Probe with Ultrahigh Extraction and Sensitivity for DNA Oligomer

Tang LAL, Wang JZ, Loh KP*, JOURNAL OF THE AMERICAN CHEMICAL SOCIETY, 132 10976-10977, P2010