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Graphene radicals: Manipulations and applications

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Free radicals have many functions, for example, as catalyst for chemical reactions and anti-oxidants in personal care products. However, most of the radical species used in industrial processes are highly toxic, expensive and not stable. Developing green, low-cost and stable free radicals is hence significant. It has been revealed that radicals exist on the edge and defects of graphene. The radicals have been found to be ultra-stable and non-toxic. Their stability is attributed to the rigid π -conjugated planar structure of graphene which acts like a physical barrier for the radicals and prevents them to react with each other. Although the presence of graphene radicals has been demonstrated, little is known on how to control their production. Furthermore, the potential applications of graphene radicals remain largely unexplored. To understand graphene radical and its formation, chemical oxidation and exfoliation of graphite followed by different reduction method was used as a technique for mass production of graphene. The chemical characterisation of GO and reduced GO samples beside the free radical measurements has indicated that the maximum radical content could be obtained on GO samples with a specific atomic ratio of carbon to oxygen. This means over oxidizing or over reducing of GO can decrease the radical population on its surface.

Biography

Zahra Komeily Nia is doing her PhD at Deakin University (Australia) and received her master and bachelor's degrees from Tehran polytechnic (Iran) and Guilan universities (Iran). As an undergraduate student she studied textile engineering and has some working knowledge in the field of chemistry of natural and synthetic fibers. During her master study, she has worked on nanomaterial characterization and fabrication and her research work was more focused on material science and engineering. In Feb 2015, she has received Deakin University Postgraduate Research Scholarship (DUPR) and has worked on advanced characterisation of graphene as her PhD project. She has published papers on her postgraduate research.

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