

Characterising chemical functionality on carbon surfaces

Wildgoose, G.G. , Abiman, P. and Compton, R.G.

Department of Chemistry, Physical and Theoretical Chemistry Laboratory, University of Oxford, United Kingdom

Abstract

This feature article introduces the reader to the surface chemistry and structure of graphitic carbon materials, including carbon nanotubes. Recent work involving the development of dual labels that allow us to selectively and quantitatively label carboxyl and general carbonyl groups (such as quinones, ketones and aldehydes) and to distinguish between ortho- and para-quinone groups is reviewed. In addition, the mechanisms of covalent, chemical derivatisation of these surfaces and the reactive sites towards attack by radical and cationic intermediates are discussed, as well as the interesting effects on the pK_a values of organic molecules that attachment to a carbon surface can induce. When combined, the methods described herein allow one to differentiate and explore the chemical functionality and reactive sites on graphitic carbon surfaces.

Indexed keywords

A-carbon; Carbon surface; Carbonyl groups; Cationic intermediates; Chemical functionality; Derivatisation; Graphitic carbons; Organic molecules; Quinone groups; Reactive site

Engineering controlled terms: Aldehydes; Chemical attack; Ketones; Labels; Surface chemistry; Surface structure

Engineering main heading: Carbon nanotubes