

Functionalization of the surfaces of materials with organic moieties using aryl diazonium salts as a radical source

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Modification of the material surfaces with aryl radicals derived from the aryl diazonium salts permits to create nanocomposites that contain covalently grafted polyphenylene layers of different thickness that are used for different purposes. [1] The generation of aryl radicals can be triggered by electrochemical or chemical reduction of aryl diazonium salts in aqueous acid or organic solution. 2,6-dimethylbenzendiazonium salt (2,6-DMBD) represents an exception because its aryl radicals obtained upon its electro-chemical reduction does not react with the material surface due to the steric hindrance, Figure 1a. Nevertheless, due to their very high reactivity aryl radicals react steadily in the solution when they are able to remove a hydrogen atom from the solvent, [2] or an iodine or bromine atom from alkyl or aryl halides and generate alkyl radicals, Figure 1b. These new radicals, are formed with a positive potential shift of ~ 1.7 V compared to their direct reduction, react easily with the electrode surface and form in their turn strongly attached alkyl layers, Figure 1c. [3,4,5] Therefore, using aryl diazonium salts as a source of aryl radicals enable to tether various types of carbon including coal, metal and semiconductor surfaces with alkyl layers via a radical crossover reaction. [6] Taking advantage of this property of 2,6-DMBD it was also possible to make direct polymerization of vinylic monomers onto gold, iron, copper and various carbon surfaces without any primary layer grafted previously on their surfaces. [7]

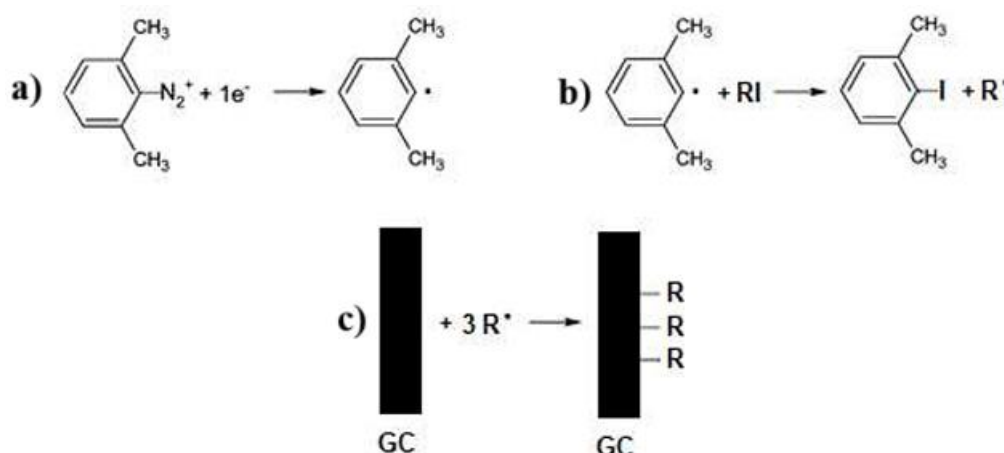


Fig. 1. Modification of GC surface with alkyl groups derived from RI by using 2,6-DMBD as a source of aryl radicals. [5]

References

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