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## Key parameters when developing carbonaceous materials for catalytic wet peroxide oxidation

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Catalytic wet peroxide oxidation (CWPO) is an advanced oxidation process, operated using simple equipment and mild operating conditions, in which highly oxidizing hydroxyl radicals (HO•) are generated from the catalytic decomposition of hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) [1, 2]. Since the report of Lücking *et al.* in 1998 [3], the development of suitable carbonaceous materials (without any added metal phase) for CWPO has been intensively explored [4]. The influence of structural and surface chemical features on their adsorption and catalytic performance was also a subject of study and discussion. In the present work, gathering the knowledge acquired in the last few years in several publications of our research group, some crucial properties that should be combined when developing carbonaceous materials for CWPO applications are identified (*cf.* Figure 1a) and thoroughly explored. For instance, graphene-based materials were recently reported as active and stable catalysts for the CWPO of highly concentrated 4-nitrophenol solutions (5 g L<sup>-1</sup>), the main active sites being at electron rich regions generated from the confinement of delocalized  $\pi$ -electrons caused by structural defects [5]. The mechanism over these active sites involves the reductive decomposition of H<sub>2</sub>O<sub>2</sub> to generate HO•, as shown in Figure 1b.

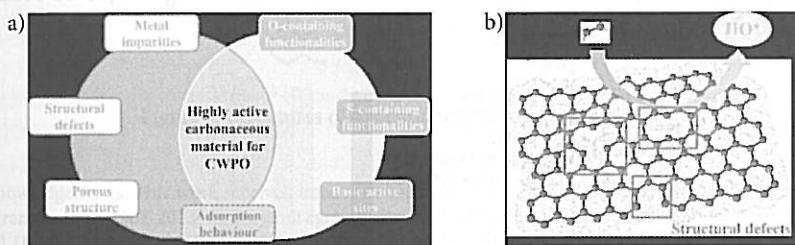


Figure 1. (a) Key parameters when developing carbonaceous materials for CWPO. (b) Electron rich regions caused by structural defects in a reduced graphene oxide sheet, which act as active sites for the generation of HO• radicals.

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