

 **CARBON** 2015

**INNOVATION WITH  
CARBON MATERIALS**

# Abstracts: Lectures



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# The influence of carbon material properties on the efficiency of catalytic wet peroxide oxidation processes

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Carbon materials are well known catalysts for activating  $H_2O_2$  into hydroxyl radicals ( $HO^\bullet$ ), which are efficient oxidizing agents. By making use of highly reactive  $HO^\bullet$  radicals, the elimination of organic compounds can be accomplished by catalytic wet peroxide oxidation (CWPO), a water treatment technology operating under mild conditions of pressure and temperature that has gained importance due to the decreasing cost of  $H_2O_2$  and its increasing use in wastewater treatments. The application of metal-free carbon materials in CWPO represents a major advance due to its versatility, simplicity of use and ease of recovery. However, it has been observed that the efficiency of CWPO is influenced by several characteristics of the carbon materials, such as metal impurities, textural and structural properties, surface chemistry and adsorptive interactions. While the rate of  $H_2O_2$  decomposition increases with surface basicity and structural defects, the large amounts of generated  $HO^\bullet$  leads to parasitic and scavenging reactions, limiting the efficiency of the organic pollutants degradation. On the other hand, the increase of the pollutant/catalyst ratio leads to a more controllable  $H_2O_2$  decomposition, increasing the degradation efficiency of the organic pollutant molecules adsorbed nearby the generated  $HO^\bullet$ . The proper tuning of the carbon material properties is thus crucial for developing active, stable and efficient catalysts for CWPO. This communication reports the findings obtained in recent years by our research group.