New electrochemical approaches for the characterization of unstable copper-oxygen species

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The development of energy-efficient, environmentally benign and cost-effective catalysts which can selectively oxidize C-H bond of alkanes remains a formidable social challenge. Current research is moving towards molecular Cu-based catalysts which use O_2 as oxidant,[1] and are inspired from the active site of two specific enzymes, namely pMMO and LPMO.[2] Many structural and spectroscopic information have been obtained for more than 30 years on different copper-oxygen adducts, from the reaction of copper complexes with O_2 (Fig.1).[1,3] However, very few redox data have been reported so far because of the instability of these species. In this context, we have developped original cryo-(spectro)electrochemical approaches which allow the *in-situ* generation and characterization of transient copper-oxygen species (Fig. 1).[4-6]

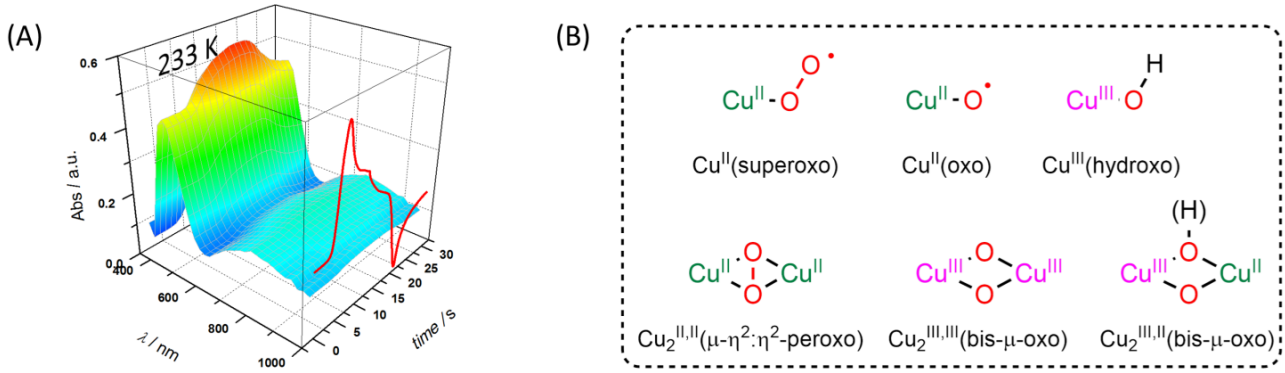

Figure 1 (A) Spectroelectrochemical monitoring at 233 K of the oxydation of a copper-oxygen adduct; (B) Different Cu_nO_2 species suggested for the activation of the C-H bond of alkanes.

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