University of Milano-Bicocca, Department of Materials Science, via Cozzi 55, 20125 Milano

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Building U5– Aula seminari

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The role of nitrate ions on the photocatalytic synthesis of high-value added compounds

Nitrate ions have been often considered inert species in irradiated photocatalytic suspensions. In fact, photocatalytic degradation of various pollutants generally proceeds with similar kinetics regardless of the presence of nitrate ions. However, the joint use of EPR and UV-vis spectroscopy shows that nitrate radicals are formed by hole induced oxidation of nitrate ions in irradiated TiO_2 suspensions. Known as "nocturnal radicals", nitrate radicals are photolabile species which induce oxidation reactions of great importance for the self cleaning ability of the atmosphere during night time. The lifetime of nitrate radicals is, however, enough to induce useful photocatalytic reactions for the synthesis of high value added compounds. Their role is evidenced, for instance, in the photocatalytic production of elemental bromine and in the nitration of model alkene compounds. These results not only allow deeper understanding of photocatalytic processes, but open the route to new green photocatalytic syntheses and to new insights in the field of atmospheric chemistry.