Surface graphitization of TiO_2 to drive optical properties, to taylor the absorbtion and decomposition of dyes under visible light

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Eliminating dyes from polluted waters is an important goal. Degussa TiO_2 P25 is introduced here as a well-recognized reference of low activity when photocatalytic reactions are performed with an irradiation in the visible range. To activate titania, carbon is deposited either starting from glucose or from P123, for a similar C-amount of 3 wt %. Graphitization is obtained by a thermal treatment under Ar (at 150 ml/min) and up to 800°C (very quickly, less than 30 min from RT to 800°C). Titania band-gap is modified with a large absorption that occurs in the visible range. Activities for a dye absorption (methylene blue) and decomposition are compared with a special attention to pH conditions, using a phosphate buffer, specifically prepared to have a constant pH of 7.0.

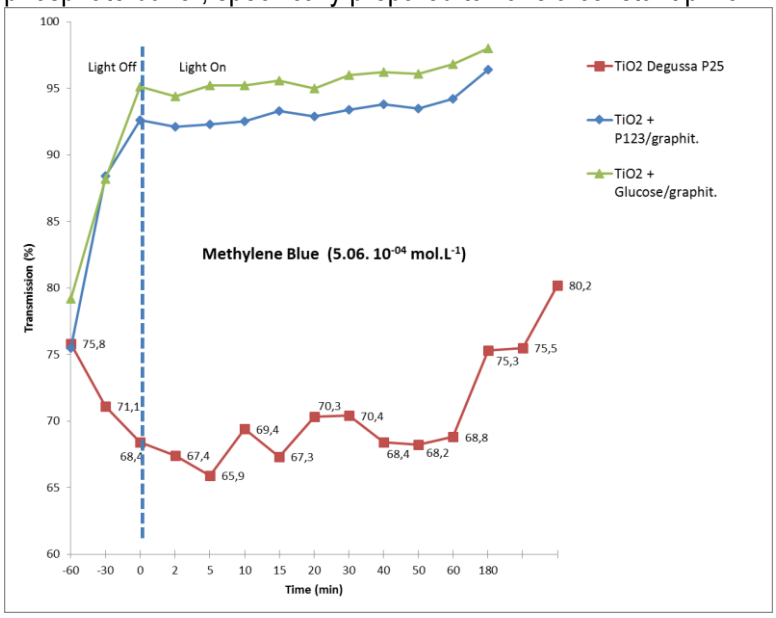

Figure 1. Methylene blue absorption and decomposition on several solid catalysts (experimental conditions: 100 ml, K_2HPO_4 and HK_2PO_4, pH 7; concentration of dyes: $5.06.10^{-4}$ mol.L^{-1}; T = 30°C; visible light: halogen).

Pure titania (uncalcined) and TiO_2/P123/graphit. have a similar absorption capacity, not obtained for TiO_2/glucose/graphit. Better results are nevertheless obtained with TiO_2/glucose/graphit. (recovered final transmission larger than 95%). Our results, which indicate that a layer of porous carbon can significantly ameliorate the absorption and decomposition of organic molecules are expected to help in the development of new catalysts formulation for water depollution.

Oral Presentation: ☐

If oral presentation which session: **Nanoparticles** | Chairs: Prof Nguyen T.K Thanh, Dr Tapas Sen

Additional flash poster possible: Title: "Methanol photocatalytic oxidation with rhodamine as a sensibiliser", authors W. Chettah, M. Medjram, S. Barama and A. Davidson