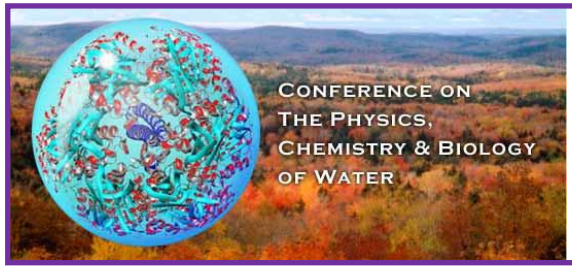

The 7th Annual Conference on the Physics, Chemistry and Biology of Water

What an electron-hole pair upon UV irradiation of TiO_2 can do besides the red-ox reactions

Cecilia B. Mendive[1,2], David Hansmann[3], Mariano Curti[1], Thomas Bredow[3] and Detlef Bahnemann[2]

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In Germany

Leibniz Universitaet Hannover

Nanotechnology and Photocatalysis

Group of Prof. Detlef Bahnemann

Back to Argentina !

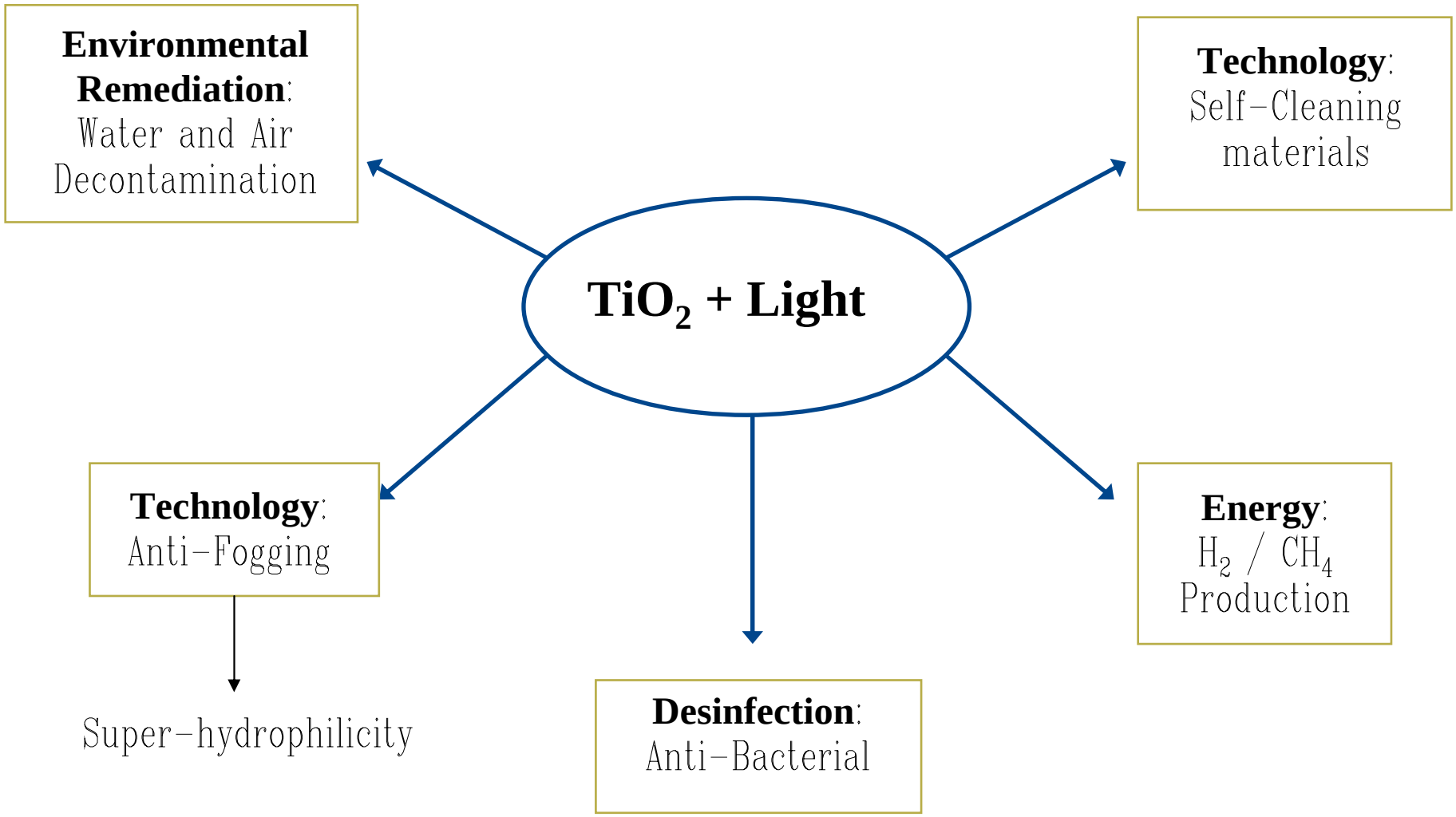
Mar del Plata

Our research group

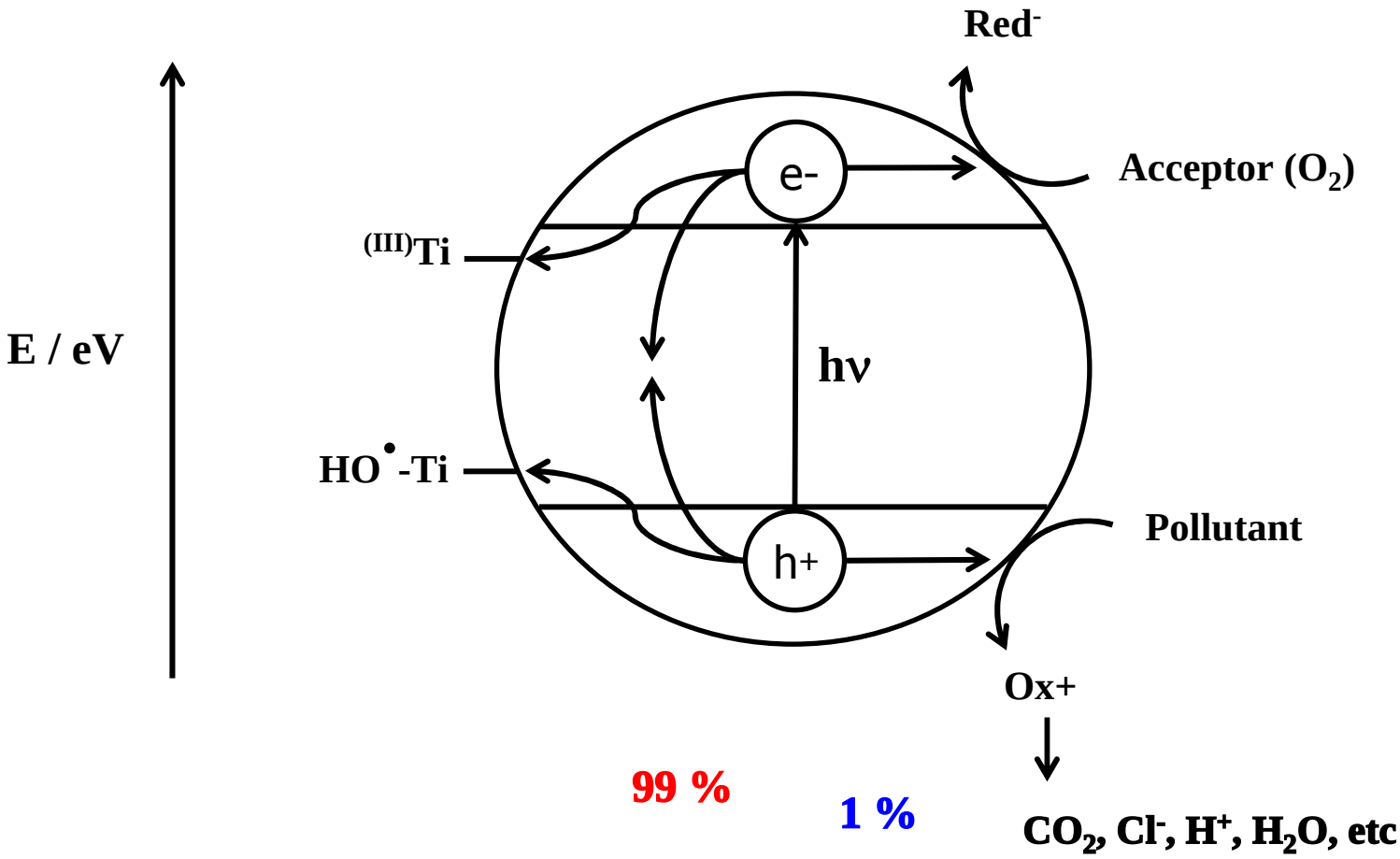
at the National University

of Mar del Plata

Fields of Applications

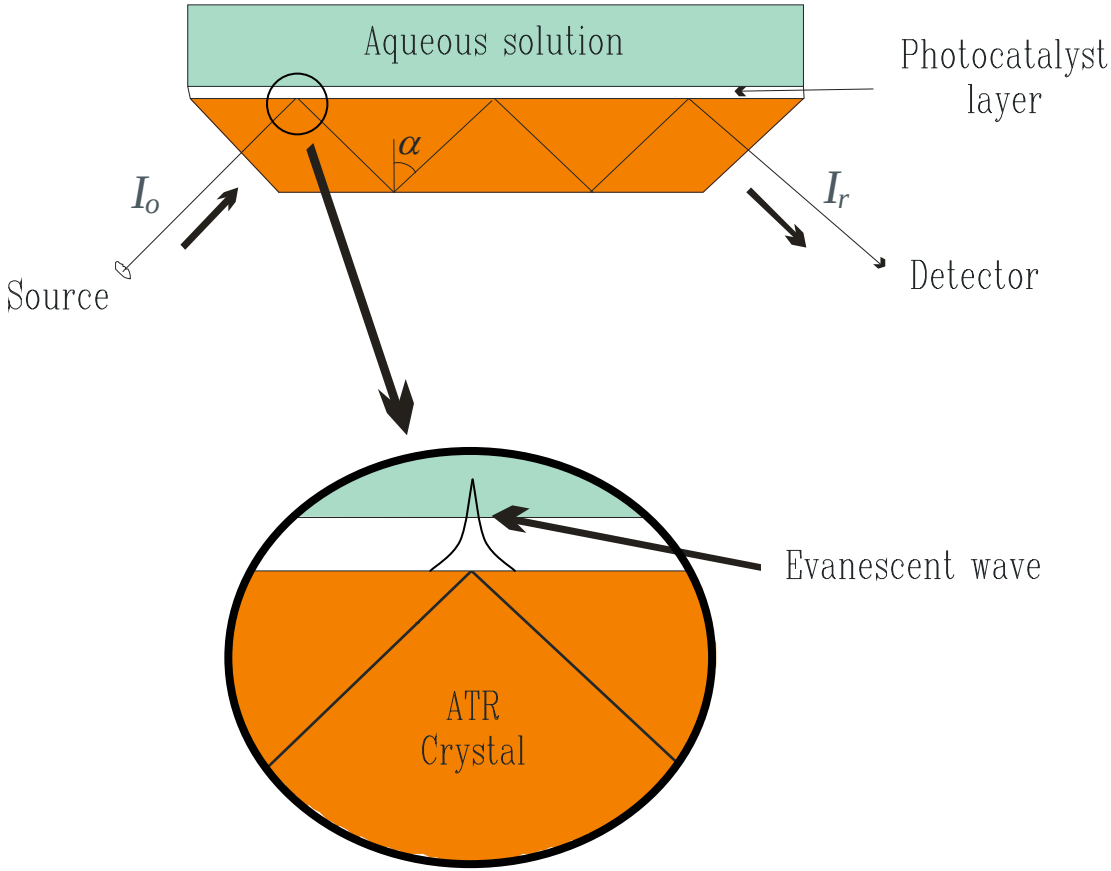


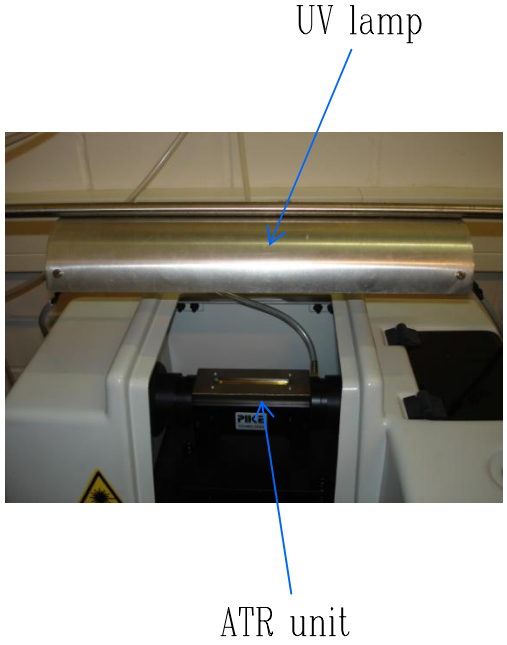
Principle of (heterogeneous) photocatalysis



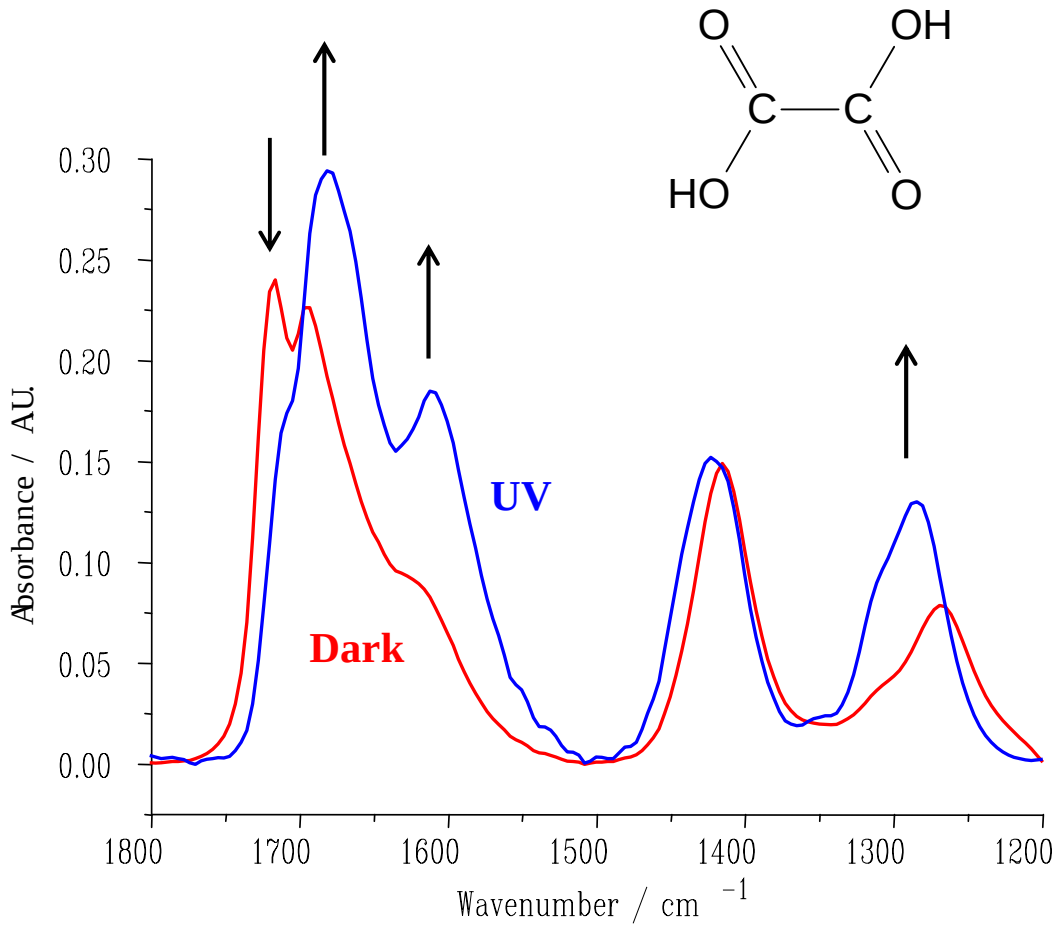
How to assess the photocatalyst surface

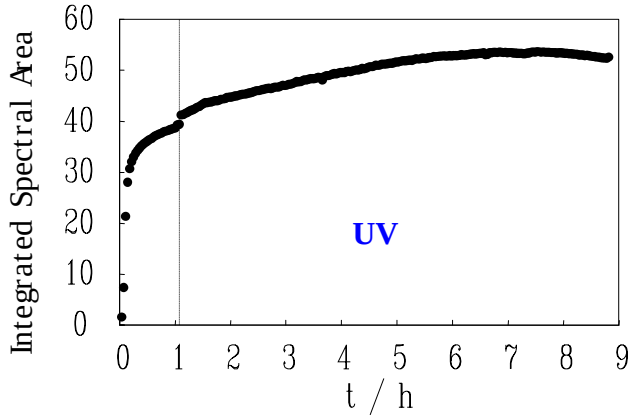
Attenuated Total Reflection – IR Spectroscopy

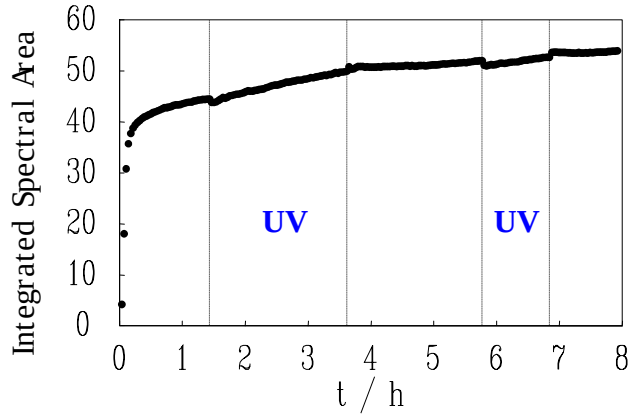




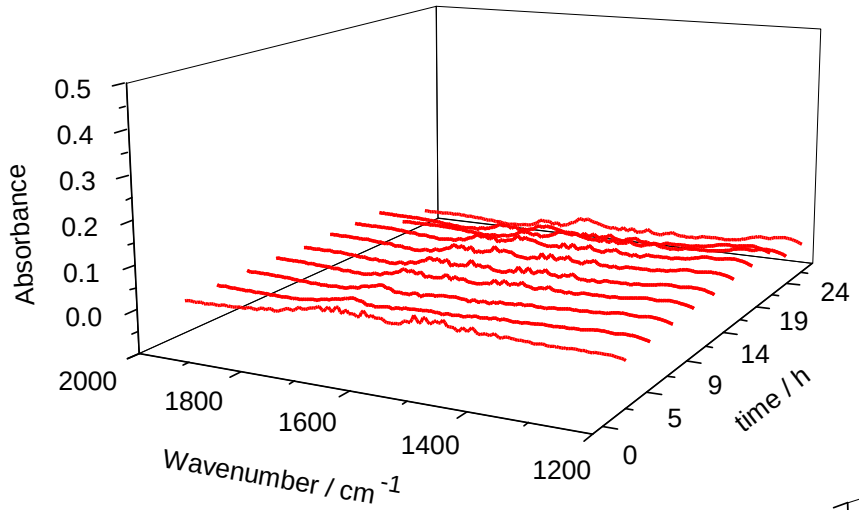
Oxalic acid and TiO_2 (anatase)





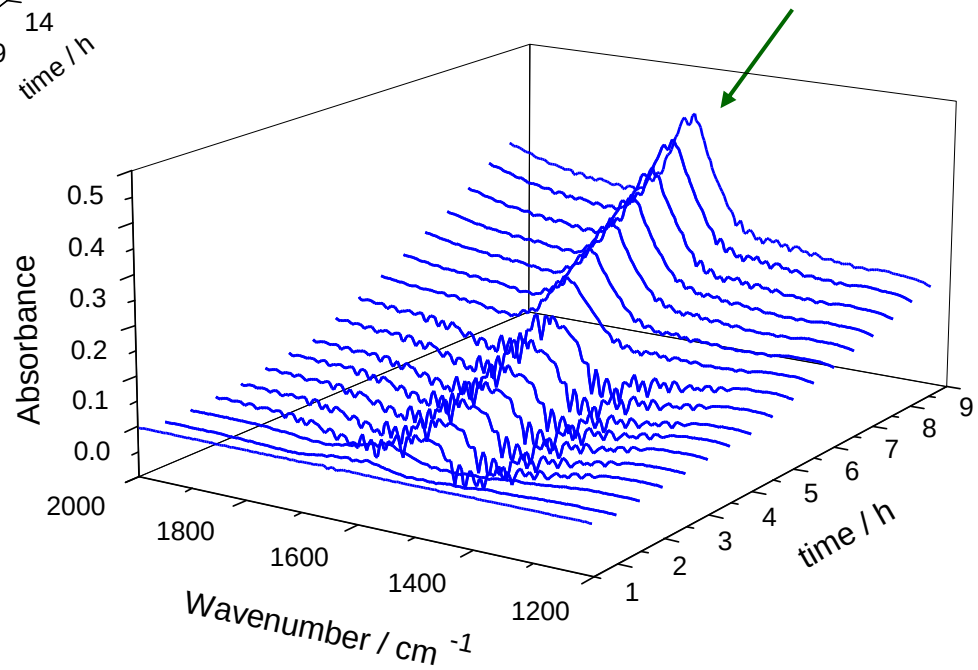


Water and TiO_2 (anatase)

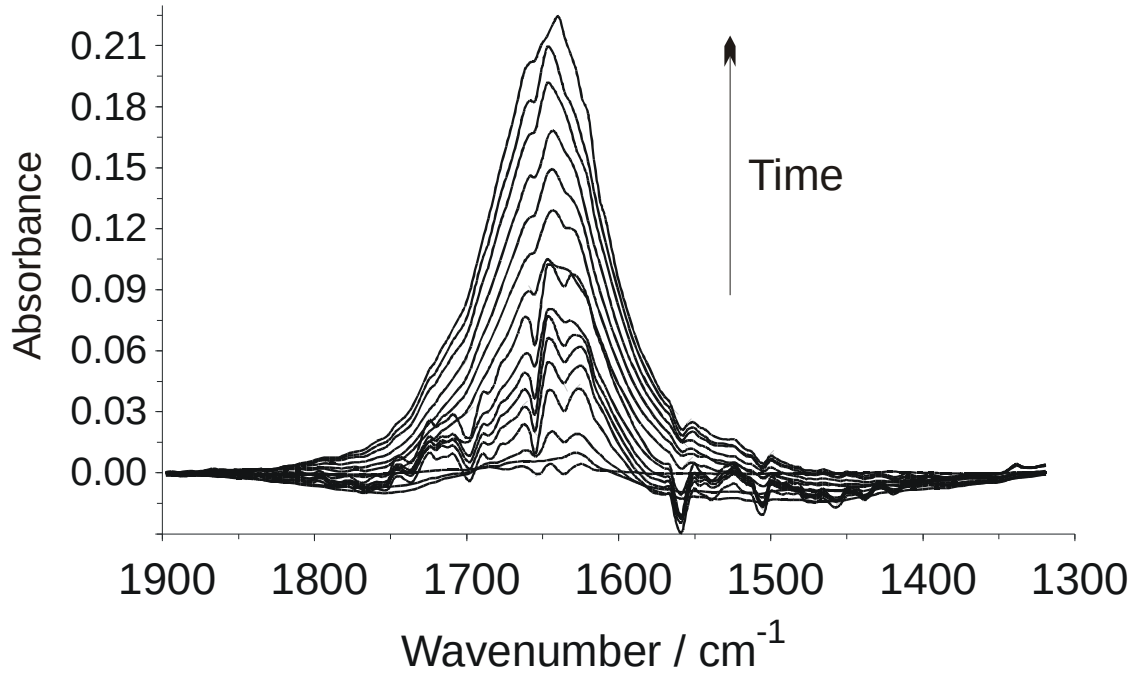


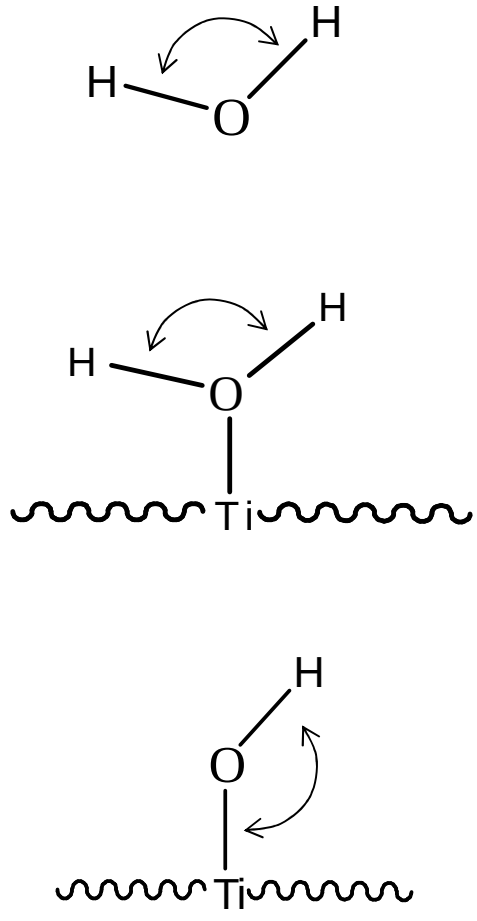
Dark

UV

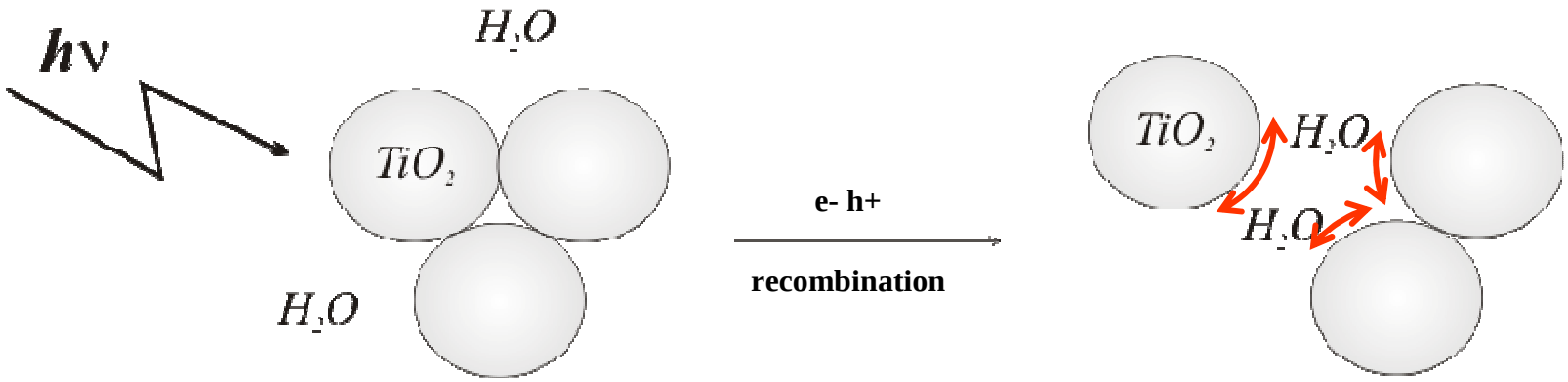


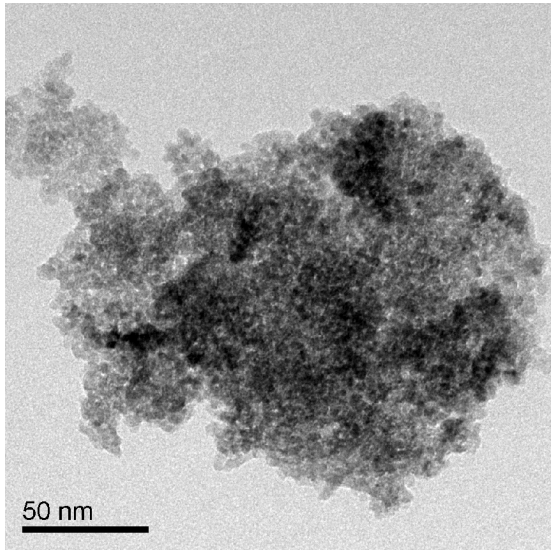
Bending mode of Water

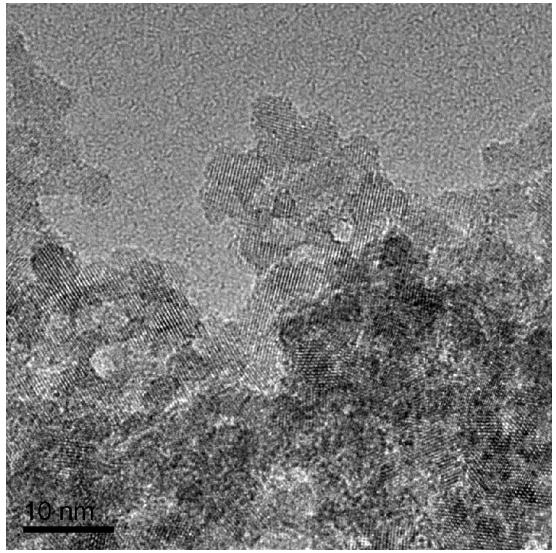


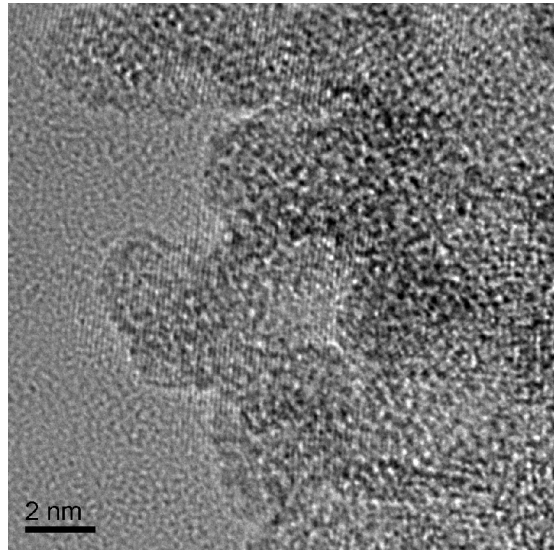


The model: DEAGGREGATION

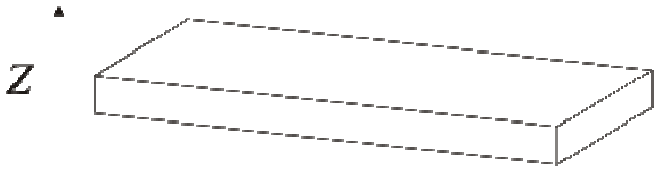






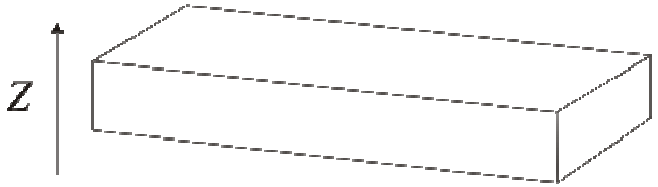


Estimation of the added Water



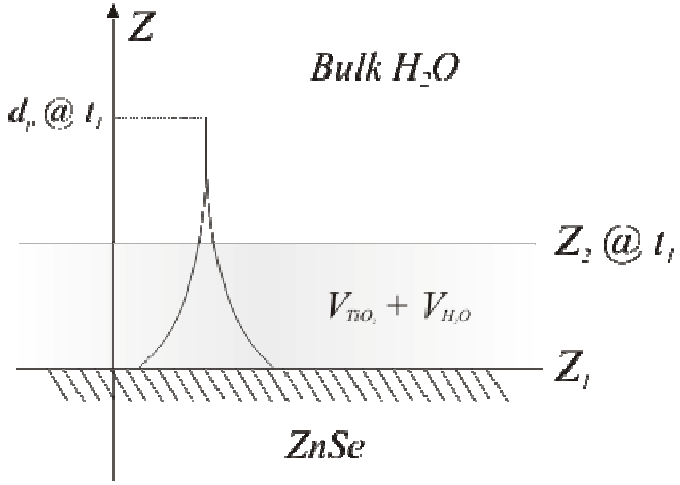
$V'_{Total} = V_{TiO} + V_{H_2O} = x \times y \times (z_2 @ t_1)$

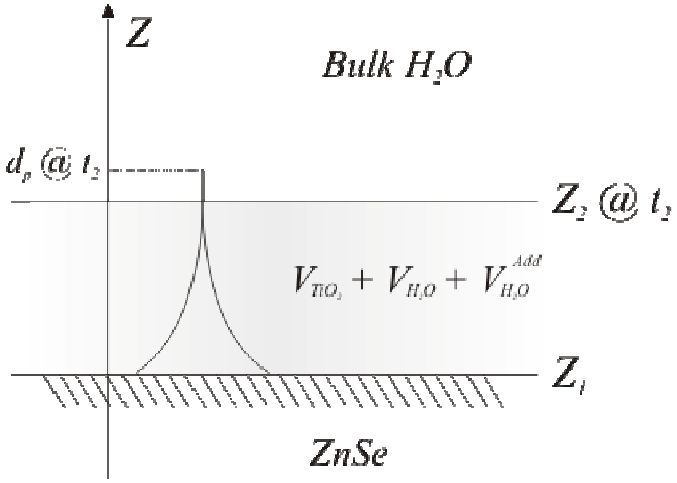
t_1



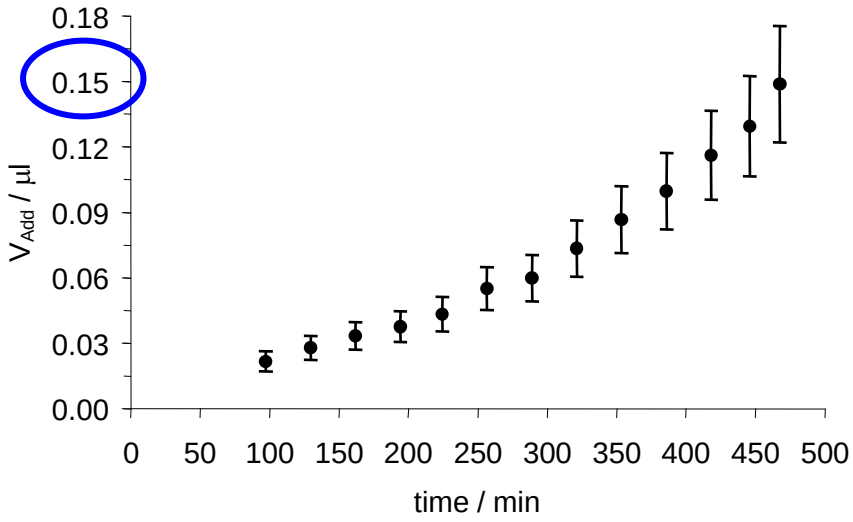
$V'_{Total} = V_{TiO} + V_{H_2O} + V^{Add}_{H_2O} = x \times y \times (z_2 @ t_2)$

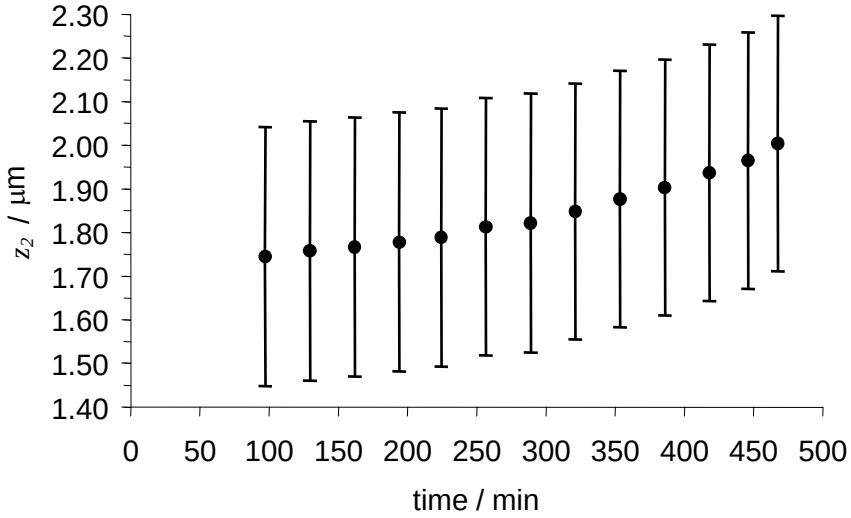
t_2





Volume expansion





V_{H2O} added = 0.15 ml that is **18 %**

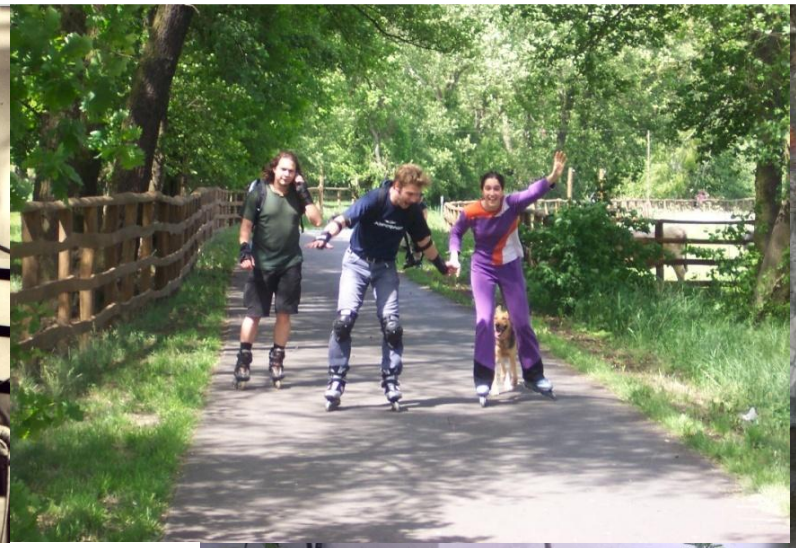
Summary

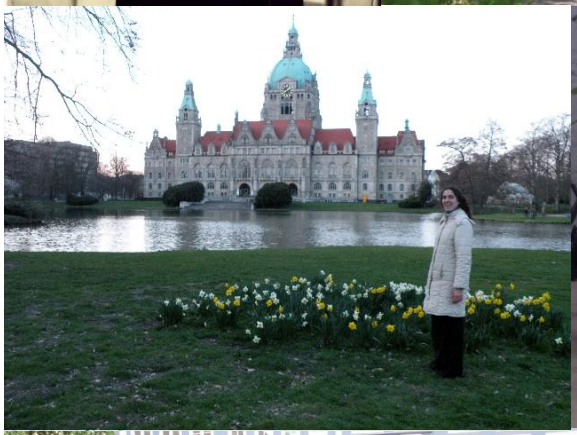
- Enhanced adsorption of oxalic acid under UV irradiation
- Bending mode of water in a wet TiO_2 layer rises only under UV irradiation

- The wet TiO_2 layer expands with a volume of water: free and adsorbed
- **Inactive e-/h+ pairs become active: DEAGGREGATION**

Open questions

- Additional surface area is generated upon UV irradiation: the same magnitude in the presence of any pollutant?
- The particles do not swim away, why?: EZ?





Thank you !