





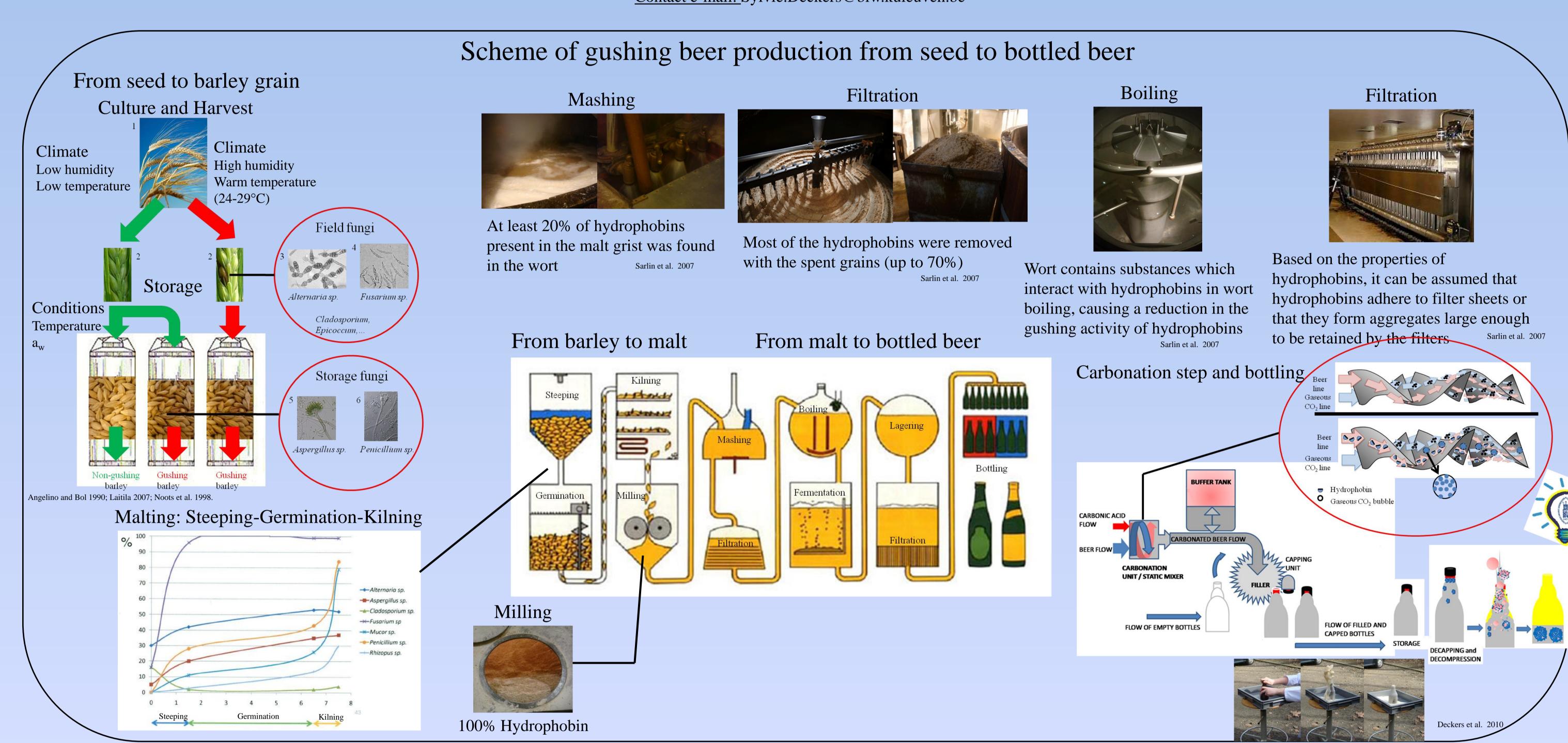
KULeuven-M²S-m³⁵

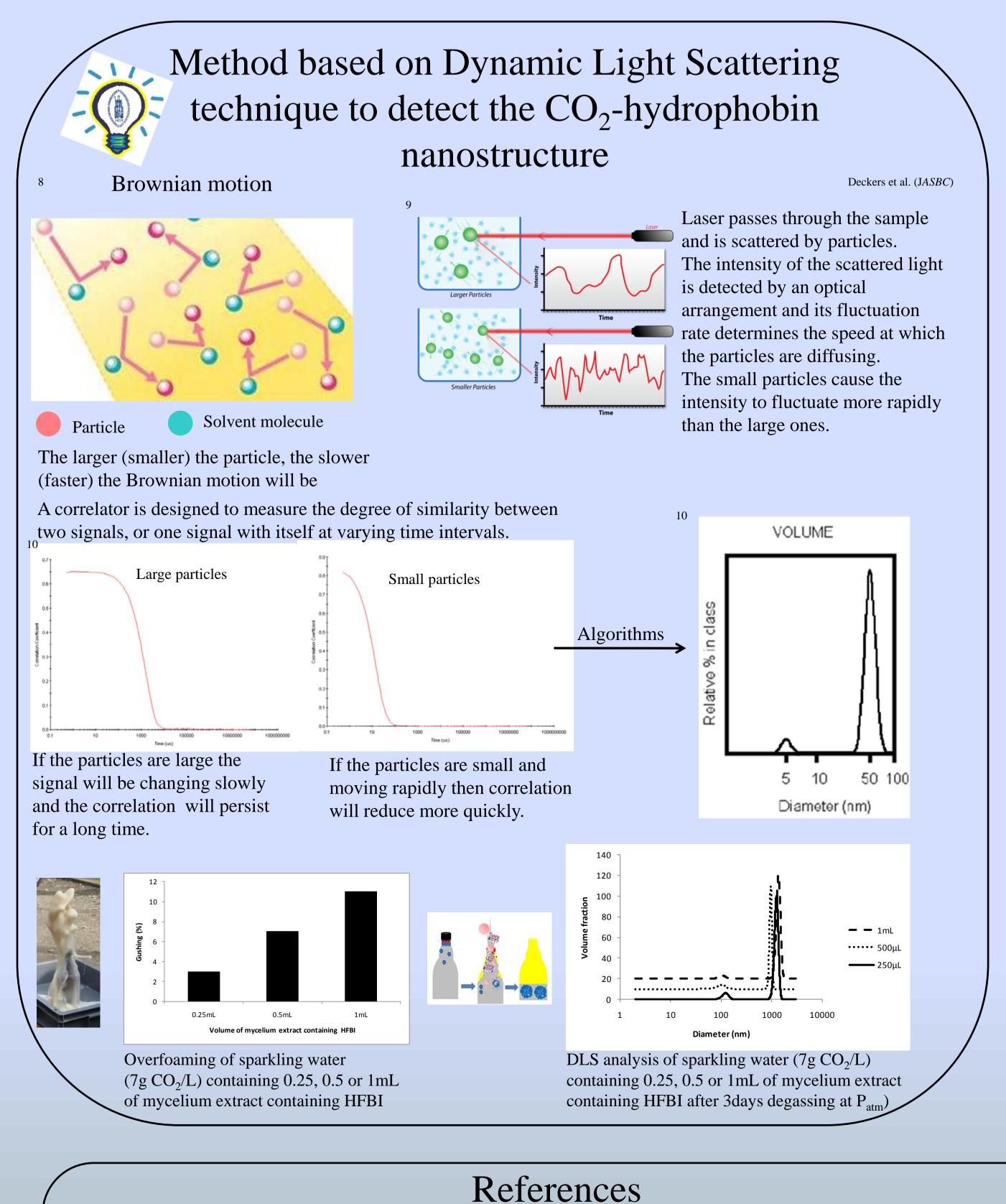
Physico-chemistry and thermodynamic involved by primary gushing:

a review

Guy Derdelinckx¹, Sylvie M. Deckers¹, Mohammadreza Khalesi¹, Zahra Shokribousjein¹, Kurt Gebruers², Yannick Lorgouilloux³, Geert Baggerman⁴, Hubert Verachtert¹, Jan A. Delcour², Chris Michiels², and Johan Martens³

¹Department of Microbial and Molecular Systems (M²S), Malt&Beer Science (MBS), Leuven Food Science and Nutrition Research Centre (LFoRCe), Kasteelpark Arenberg, 33, BE-3001 Heverlee, Belgium; ² Department of Microbial and Molecular Systems (M²S), CLMT, Leuven Food Science and Nutrition Research Centre (LFoRCe), Kasteelpark Arenberg 22, BE-3001 Heverlee, Belgium ³ Department of Microbial and Molecular Systems (M²S), Centre for Surface Chemistry and Catalysis, Kasteelpark Arenberg 20, BE-3001 Heverlee, Belgium; ⁴ ProMeta Interfacultary Centre for Proteomics and Metabolomics, O&N II, Herestraat 49, BE-3000 Leuven, Belgium Contact e-mail: Sylvie.Deckers@biw.kuleuven.be





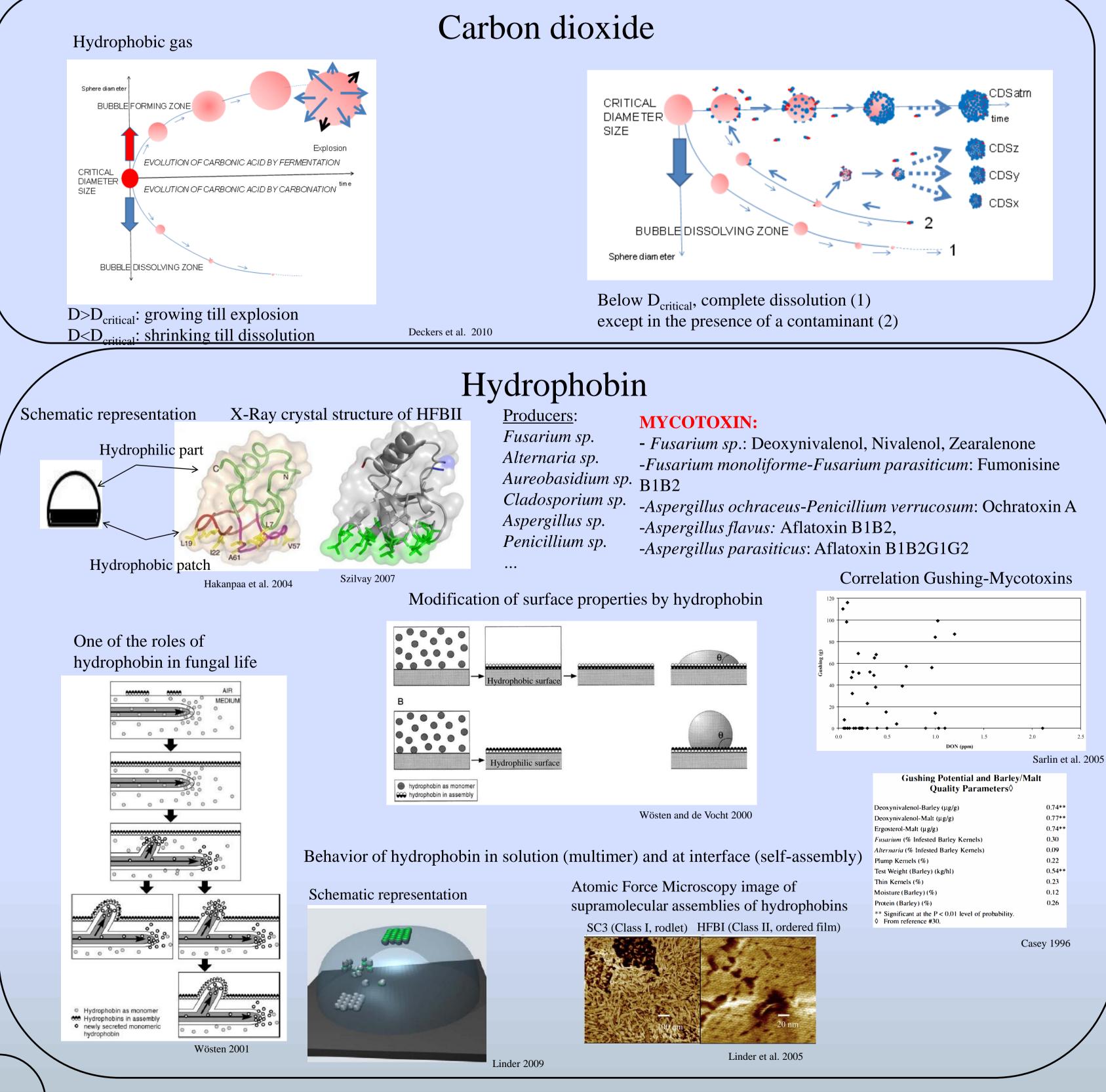
- Shokribousjein et al. [2011]. Hydrophobins, beer foaming and gushing. Cerevisia Belgian Journal of Brewing and Biotechnology 35, 85-101.

- Szilvay [2007]. Self-assembly of hydrophobin proteins from the fungus *Trichoderma reesei*. Dissertation, University of Helsinki, 64p.

- Wösten and de Vocht [2000]. Hydrophobins, the fungal coat unravelled. Biochimica et Biophysica Acta 1469, 79-86.

- Wösten [2001]. Hydrophobins: Multipurpose proteins. Annual Review of Microbiology 55, 625-646.

Brewing Chemists, In Press.



- Angelino and Bol [1990]. Impact of microflora during storage and malting on malt properties. Proceeding of the IVth Chair J. De Clerck, Leuven, Belgium. References (Internet) - Casey [1996]. Primary versus secondary gushing and assay procedures used to assess malt/beer gushing potential. MBAA Technical Quaterly 33 (4), 229-235. - Deckers et al. [2010]. CO₂-Hydrophobin structures acting as nanobombs in beer Part I: A critical review of hypotheses and mechanisms. *Brewing Science* 63 (03/04), 54-61. - Deckers et al. [xxxx]. Dynamic Light Scattering (DLS) as a tool to detect CO₂-hydrophobin structures and study the primary gushing potential of beer. Journal of American Society of -Hakanpää et al. [2004]. Atomic resolution structure of the HFBII hydrophobin, a self-assembling amphiphile. The Journal of Biological Chemistry 279 (1), 534-539 - Linder et al. [2005]. Hydrophobins: the protein-amphiphiles of filamentous fungi. FEMS Microbiology Reviews 29, 877-896. - Linder [2009]. Hydrophobins: Proteins that self assemble at interfaces. Current Opinion in Colloid & Interface Science 14, 356-363. - Noots et al. [1998]. From field barley to malt: detection and specification of microbial activity for quality aspects. Critical Reviews in Microbiology 25 (2), 121-153. -Sarlin et al. [2007]. Fungal hydrophobins in the barley-to-beer chain. Journal of the Institute of Brewing 113 (2), 147-153. -Sarlin et al. [2005]. Fungal hydrophobins as predictors of the gushing activity of malt. Journal Institute of Brewing 111 (2), 105-111.

ones [2010], http://en.wikipedia.org/wiki/File:DLS.svg

Acknowledgements

For their active participation in the KUL-University Foundation-Hydrophobin Chair; we acknowledge Breweries Duvel-Moortgat (H. Neven), Orval (J-M. Rock), Chimay (P. Etienne) and Cargill Malt (S. Vangoidsenhoven). We acknowledge also Mouterij Dingemans (K. Dingemans) and Brewery La Zaragozana (A. Fumanal) for barley grains supplies. This work involves collaborations with ProMeta, Laboratory of Food Microbiology, Laboratory of Food Chemistry and Biochemistry and Centre for Surface Chemistry and Catalysis. Spadel S.A is thanked for supplying calibrated sparkling water.

Poster presented at the 33rd EBC Congress (May 2011, Glasgow)