

Laudatio Gorter Prize 2022

The Gorter thesis prize for 2022 is awarded to Dr. **Donny Merckx** for his Doctoral thesis on “Mechanism-based markers for early assessment of lipid oxidation in mayonnaise by magnetic resonance spectroscopy”.

The jury appreciated the completeness of the thesis: the candidate applied different magnetic resonance tools to unravel the mechanism of lipid oxidation in a real complex food matrix. Even though lipid oxidation has been studied for many decades by a combination of techniques, still several aspects on its mechanism and how it related to stability of lipids-containing food emulsions remained unclear.

This thesis demonstrates the power of quantitative NMR as a high-throughput and robust methodology to monitor known oxidation mechanistic markers like hydroperoxides and aldehydes. The limitation on lack of sensitivity from NMR as compared to other techniques was circumvented by the smart application of band-selective excitation. Furthermore, the thesis revealed novel insights on the role of epoxides in lipid oxidations, which so far could not be quantified by other techniques.

The author could successfully assess the role of these markers in real food matrices by developing and applying 2D HSQC quantification principles. Also, ^1H NMR was used to understand and evaluate ESR technologies to access radicals as an early oxidation marker. Finally, the role of iron metals from the protein phosvitin, a key ingredient in mayonnaise coming from egg yolk, on lipid oxidation was investigated by ^{31}P NMR.

The jury was very impressed by the thoroughness of the investigation of all aspects of lipid oxidation, from different marker measurements to understanding the role of ingredients. Moreover, these data were combined into a mechanistic model to predict stability. All these aspects together demonstrated that the Question was central for the author. This nicely written thesis reports an objective, open and transparent evaluation of capabilities and limitations of magnetic resonance to solve this complex challenge in food industry.