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Can neutron reflectometry monitor the kinetics of thin film lipolysis?

Content

The triglyceride aqueous interface has an important role in many processes, none more so than lipase activity. Lipases, such as Thermomyces lanuginosus lipase (TLL), are responsible for the degradation of triglycerides to smaller components, such as diolein, monoolein, glycerol and fatty acids. TLL attracts considerable interest in the food and pharmaceutical industries due to the catalytic behaviour it possesses [1]. While the TLL lipolysis of triglyceride films has previously been investigated, [2,3] the influence of the reaction products on this process is poorly understood.

This aim of this study was to identify the chemical species present in a triolein film before and after TLL digestion and to monitor the physical properties of the film with high time resolution throughout lipolysis. The thickness, mass, and elasticity of the film was continuously monitored over several hours enabling a detailed in-sight into the changes to the physical properties of the triolein film throughout these processes. These findings were used to optimize the experimental design and sample preparation for the subsequent neutron reflectometry experiments performed at ILL and ISIS. Here, it was possible to measure the reflectivity profile of the equilibrated triolein film before and after exposure to lipase as well as monitor the kinetics of the lipolysis throughout the digestion.

References

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