Spectroscopic evaluation of detergent efficiency on stains

-an important tool in development of more efficient and environmentally friendly detergents

Keywords: Starch, Amylase, NMR, hydration, temperature, cotton, polyester

Background
Scarce water resources and environmental considerations demand for constant development of new and improved detergents to comply with the most recent legislation. In addition the consumer demands for more cost efficient washing machines have put focus on washing at lower temperatures. The latter demand has been a driving force for development of new detergent formulations containing enzymes and/or combination of enzymes that will be sufficient effective at lower temperatures and reduced amounts of water.

Test of detergents
Detergents are tested in washing machines on patches of clothes pre-treated with common types of stains such as fat, starch, milk, coffee etc. The clothes can be e.g. cotton or polyester. After washing the remains of the “standard stains” are determined in order to evaluate the efficiency of the detergent. However, it is important to be able to quantify the amount of starch on a piece of fabric both before and after wash.

Aim
The overall goal is to develop an analytical method that can quantify the content of starch in stains on cotton and polyester fabric.

Initial experiments using $^1$H high-resolution (HR) magic angle spinning (MAS) nuclear magnetic resonance (NMR) spectroscopy has shown promising results for quantifying starch on cotton and polyester swatches. The present project will take this methodology to the next stage by:

- Optimization of sample preparation, temperature and other experimental conditions
- Determination of detection limits
- Evaluation of reproducibility
- Evaluation of starch when other food ingredients are present

Contacts
- Iben Damager, Research Scientist, Novozymes. ibdg@novozymes.com
- Flemming Hofmann Larsen, Associate Professor, University of Copenhagen. fhl@food.ku.dk

Starting date: September 1st, 2014.