# New angles on understanding the use of enzymes

Proteins and surface active molecules (surfactants) interact in non-trivial ways and appear together in many physiological and technical situations. Novozymes enable transitions towards green solutions across a wide range of applications where knowledge is needed on the behavior of protein/surfactant systems. In collaboration with the NXUS project, the interaction between a fat- and oil degrading enzyme (lipase) and typical surfactants used in laundry detergents have been investigated using X-ray and neutron small-angle scattering (SAXS and SANS) at leading European research facilities.
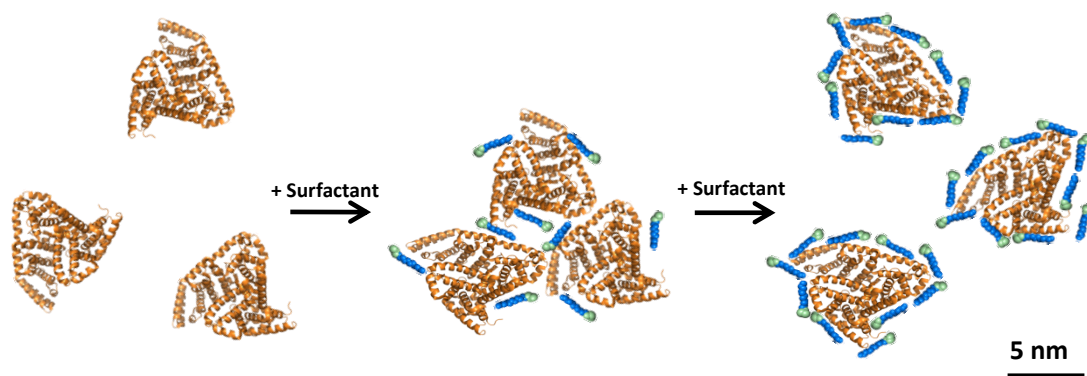
The behavior of **lipase enzymes** as more and more **surfactant** is added. When small amounts of surfactant is added, a mild clustering is observed, while the enzyme clusters dissociate when more surfactant is added.

Via advanced data analysis of the small-angle scattering data, it was found that the clustering of enzymes was dependent on both temperature and surfactant composition and concentration. This application of SAXS and SANS provides useful complementary information for better understanding formulation and use of enzyme/surfactant systems, e.g. as used in modern environmentally friendly laundry detergents.

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