

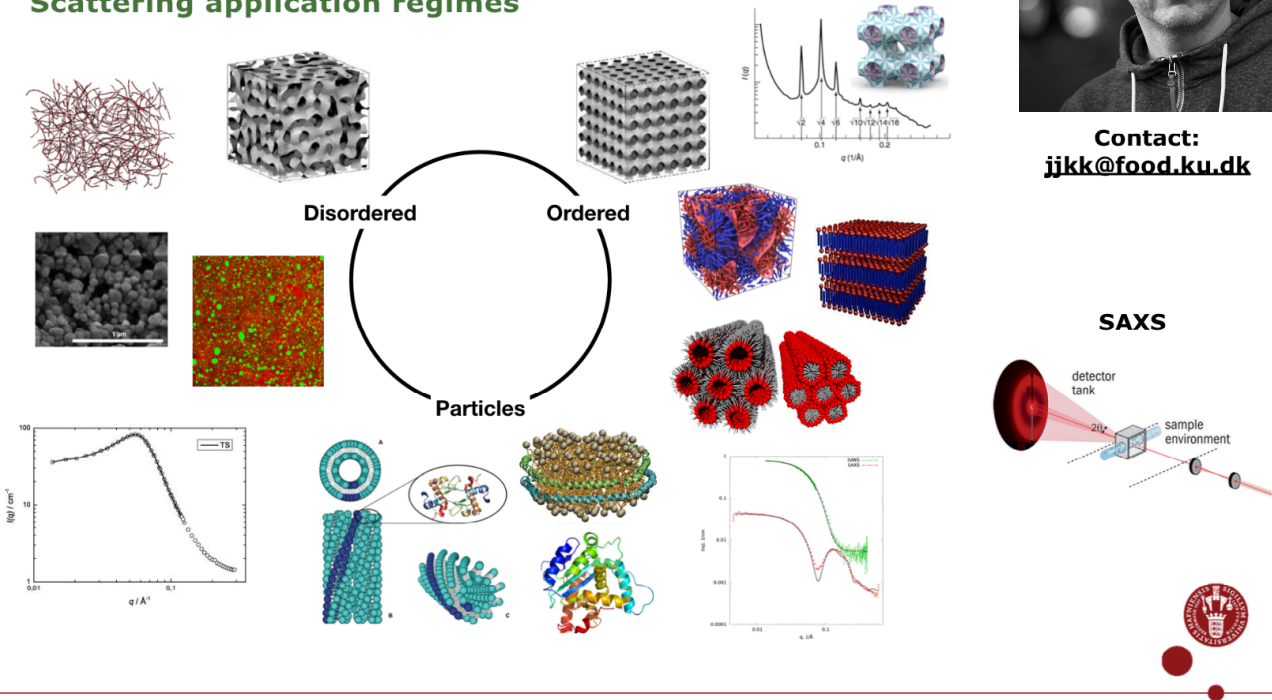
Jacob Kirkensgaard
Structural Food Physics and Soft Matter Self-Assembly

X-ray and neutron scattering investigations of nanostructures in materials
 Coarse-grained simulations of soft matter self-assembly



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Scattering application regimes



In general my research is centered around mesoscale self-assembly and particularly the formation of geometrically and topologically complex structures in soft matter systems, both synthetic systems like block copolymers and amphiphilic molecules and from various biological systems, for example photosynthetic membranes and biomacromolecules. I have combined expertise in coarse-grained molecular dynamics simulations of soft matter self-assembly and in structural investigations using small-angle x-ray and neutron scattering techniques. I have worked on a number of systems within synthetic biology, food science, electrochemistry, lipid and fatty acid polymorphism, biopolymers and complex synthetic polymers. I am heading a new hub within the Nanoscience center focused on Structural Food Physics and Soft Matter Self-Assembly and I am employed jointly at NBI and FOOD at KU. I am running two in-house SAXS/WAXS instruments which make a nice platform for projects. In terms of specific projects, the following are some current ideas - but others could easily be formulated to accommodate your particular interests:

Potential project headlines:

Nanostructural effects of high pressure processing in food production (experimental)

Ethylcellulose-based oleogel structure (experimental)

Block-copolymer self-assembly in solution (experimental)

RheoSAXS studies of polymer or fibrous soft matter (experimental)

Computational topology of soft matter self-assembly (w. Martin C. Pedersen, NBI, theoretical)

Simulation of block copolymer or active matter self-assembly under hyperbolic confinement (w. MC. Pedersen, NBI, theoretical)

Examples of recent or ongoing projects:

Role of nanostructure on lipid oxidation studied with light scattering, x-ray scattering and electron spin resonance (MSc, Nano)

Nanostructural transitions during digestion of fat-based food (BSc, Nano)

Simulation of diblock copolymer self-assembly on hyperbolic surfaces (BSc, Physics)