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Neutrons and Food

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The subject of food is certainly newsworthy; whether the story is associated with 'food security', the growing of food for fuel, or blurring the line between food and medicine. In Australia, we have developed a programme of research in which we seek to investigate fundamental and industrial problems of national significance in food science.

One of the most ubiquitous forms of food is the biopolymer blend, starch. It is composed of amylose and amylopectin, packed into complex molecular arrangements that show a high level of organisation over several length scales from the atomic (yielding variations in crystal packing) to granular (on the micron scale). Amylopectin is assumed to contribute significantly towards the structural and physicochemical properties of starch, whereas the location and role of amylose is less understood. Recently, the amylose fraction has been under heavy scrutiny because of its resistance to enzymatic digestion driven by the potential use of high-amylose starches as ingredients in formulating foods rich in resistant starch. The consumption of such materials has been widely implicated to lead to reductions in the incidence of diet-related disease. The vast majority of the food consumed however is not composed of granular starch but is, in fact, processed - often gelatinized and retrograded – thus an understanding of starch structure must also extend to processing. The latter is well suited to neutron scattering due to the highly penetrating nature of the radiation enabling beam transmission through complex sample environments, opening up the opportunity to study industrially-relevant processes in real time.

This presentation will briefly introduce the broad application of neutron scattering methods to food-based systems within the 'Food Structure and Dynamics' group at ANSTO with a subsequent focus on our investigations of starch structure [1-8].

References

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