



USER MEETING 2016

24-25 NOVEMBER

National Centre for Synchrotron Science



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Australian Synchrotron

Contribution ID : 158

Type : Oral

Element-specific small-angle X-ray scattering studies of mineral nanoparticles in iron-fortified milk

Thursday, 24 November 2016 12:00 (15)

Most of the dietary calcium in milk is contained within casein micelles as so-called 'colloidal calcium phosphate' (CCP) nanoclusters around 2-3 nm in size. Small-angle X-ray and neutron scattering (SAXS and SANS) have been used for several decades to study the internal structure of bovine casein micelles, but there is lingering controversy over the interpretation of the scattering data [1].

Recent synchrotron scattering experiments have shed new light on this long-standing problem. Resonant soft X-ray scattering (RSoXS) of bovine milk at the Ca L_{2,3}-edges using beamline 11.0.1.2 at the Advanced Light Source, Lawrence Berkeley National Laboratory conclusively identified features arising from the CCP particles [2]. These measurements were supported by experiments conducted using the SAXS beamline at the Australian Synchrotron where the milk chemistry was modified [3]. We have extended these techniques to investigate the mineral structures in iron-fortified milk, using SAXS, RSoXS (at both the Ca and Fe L_{2,3} edges) and anomalous SAXS (at the Fe K-edge). The results will be presented and the implications discussed in terms of developing new food ingredients; the benefits and challenges of the RSoXS and anomalous SAXS techniques will also be discussed.

[1] D. G. Dalgleish, *Soft Matter* 7 (2011) 2265.

[2] B. Ingham et al., *Soft Matter* 11 (2015) 2723-2725.

[3] B. Ingham et al., *Soft Matter* 12 (2016) 6937-6953.

Keywords or phrases (comma separated)

SAXS, anomalous SAXS, milk, element-specific, RSoXS, techniques

Are you a student?

No

Do you wish to take part in the Student Poster Slam?

No

Are you an ECR? (<5 yrs since PhD/Masters)

No

What is your gender?

Female

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Session Classification : Concurrent Sessions 1: Biological Systems

Track Classification : Biological Systems