Australian Government

ANSTO
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Improving the quality of Australian dairy and food products

Microstructure of protein, fat, carbohydrates and any free moisture in dairy and food products has a significant influence on the texture and sensory properties critically important for consumer demand.

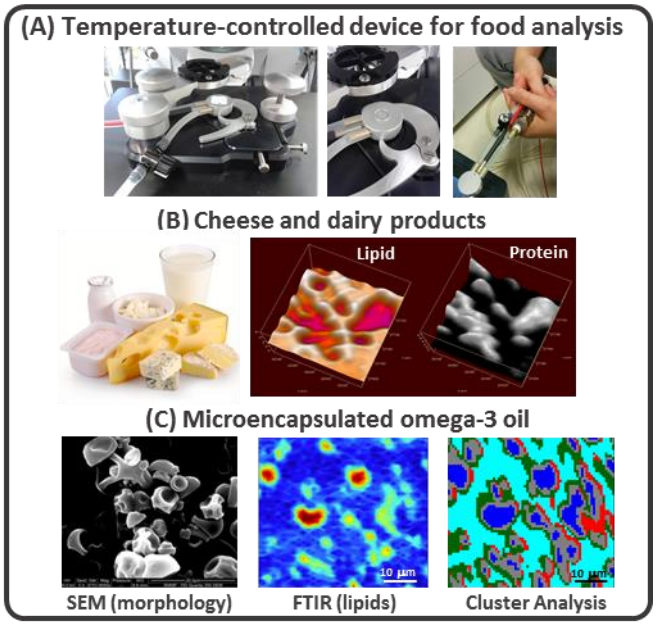
Traditional analytical techniques used in food industry require chemical staining, which is considered destructive and time-consuming.

By using the cutting-edge synchrotron infrared technique, a better understanding into the links between ingredients, processing parameters, micro-structure and function can be obtained directly in their natural state or storage condition without further preparation. Such knowledge is essential for underpinning research and development of Australian dairy and food industries.

Research & Outcomes

A specific synchrotron infrared setup was established for food analysis at Infrared Microspectroscopy (IRM) Beamline, ANSTO - Australian Synchrotron, by coupling the device with a temperature control unit (A). This allows high-resolution chemical analysis of dairy and food products to be performed in their natural state at a fixed temperature (e.g. 4 °C) to maintain freshness and without any additional chemical staining, which is not possible with traditional analytical methods. Successful applications include the analysis of cheese, cream cheese and microencapsulated oil supplements [1-3].

The results provide a deeper understanding of how different processing parameters impact the distribution and interactions between different ingredients within the microstructure (B-C). Such findings, when combined with other techniques, play a vital role in assisting the development of new formulations with tailored textural or sensorial properties to meet consumer demand. The outcomes have been used to support research and development within the Australian dairy manufacturing and food industry.



Synchrotron infrared setup for food analysis. (A) temperature-controlled device used in the study, and chemical images of lipid and protein distribution in cheese (B) and microencapsulated oil supplement (C).

Benefits & Impacts

This interdisciplinary research is led by Prof. Gras and her team from The ARC Dairy Innovation Hub at The University of Melbourne, which is funded by The ARC-ITRP scheme & Dairy Innovation Australia Limited (DIAL) and involves some of Australia's largest dairy companies. The breakthrough technical solutions gained from this research have underpinned the growth of domestic dairy manufacturing industry, and contributed significantly to the Australian economy through strong exports and regional employment.

In terms of international outlook, The ARC Dairy Innovation Hub also collaborates with Teagasc Food Research Centre, a world-class dairy research institute in Ireland. The research outcomes have effectively fostered knowledge transfer between the two world-class dairy research institutes at an international level.

References

[1] A. P. Pax, et al., *Food Chem.*, 2019, **291**, 214-222.
[2] Y. P. Timilsena, et al., *Food Chem.*, 2019, **275**, 457-466.
[3] L. Ong, et al., *Food Chem.*, 2020, **332**, 127327.