

A route to more efficient chocolate tempering

An international team of researchers found that certain phospholipids can help improve the tempering process in chocolate, potentially simplifying the chocolate production process without compromising quality.

To make the perfect glossy chocolate with the creamy texture that consumers expect, the cocoa butter used in its manufacture must crystallise in a specific way, known as a form V polymorph. Its formation can be influenced by external factors such as temperature, shear, pressure and time.

The chocolate we buy undergoes a long multi-step process to ensure the cocoa butter crystallises properly. Researchers want to know if it is possible to simplify the process by adding a phospholipid called 1,2-dimyristoyl-sn-glycero-3-phosphatidylcholine (DMPC).

Using small angle neutron scattering on SANS2D and at the ILL, and specific temperature measurements, the team confirmed that DMPC can be used to temper chocolate. However, they also observed some unwanted side effects, including cracking in chocolate at the sub-mm range when tempered solely with DMPC. The team concluded that the DMPC phase separates from the cocoa butter phase, creating large crystalline imperfections, or large microstrains, which then grow into a macroscopic crack.



Chocolate undergoes a long process to achieve the glossy texture consumers want. (Image: Pixabay)

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Unfortunately, the observed cracks means that DMPC does not perfectly simplify the chocolate tempering process. Although it is a promising compound for tempering chocolate, more recent work suggests that a similar phospholipid molecule to DMPC can actually temper chocolate without leading to crack formation, as it incorporates better within the cocoa butter crystalline lattice. Another visit to ISIS is warranted!

Alejandro Marangoni, from the University of Guelph.

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Instrument: SANS2D

Related publication: Phospholipid Self-Assembly in Cocoa Butter Provides a Crystallizing Surface for Seeding the Form V Polymorph in Chocolate. *Crystal Growth & Design*, 24, 7. DOI: 10.1021/acs.cgd.3c01130

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