Controlling Crystallization Behavior of Cocoa Butter by using High intensity ultrasound and Stirring Simultaneous Stimulation

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CB (cocoa butter) is one of the most important component of chocolate, and CB has 6 polymorphic forms. Among them, the Form V has the most suitable melting point and stability for edible use. The traditional method to transform into Form V of CB is tempering, but it takes much time and the procedure is complex. Researchers figured out that CB crystallization can be controlled by using some external stimulations such as applying high intensity ultrasound (HIU), stirring and so on. However, when applying these factors separately have their own limitations. So, this study aims to show that whether CB crystallization transform to Form V more efficiently by using HIU and stirring simultaneously or not.

Conduct the experiment with the following steps. 1. HIU were applied during the cooling and solidification of CB to perform time-resolved measurement of the crystallization and polymorphic transition process by using synchrotron radiation X-ray diffraction (SR-XRD). Measuring the melting point by DSC. 2. CB was cooled and solidified while stirring, and time-resolved measurement of the crystallization and polymorphic transition process was performed. Measuring the melting point by DSC. 3. CB is cooled and solidified while stirring, and HIU applied while stirring to measure the time-resolved of the crystallization and polymorphic transition process. Measuring the melting point by DSC. 4. Compare the measurement results of 1~discribed above, and compare the difference in crystallization rate and polymorphic transition behavior between the case where external stimuli such as simply stirring and HIU were applied and the case where stirring and ultrasound were applied and the case where stirring and ultrasound were applied at the same time.

Form V only showed when HIU and shear were applied together, in other cases, just form II transferred to form IV. Therefore applying HIU and stirring simultaneously can much more promote the Form V.