

# Ultrasonic treatment on starch granule morphology and physicochemical properties of high amylose maize starch

Chun-Hsiang Chan<sup>1</sup>, Ri-Gui Wu<sup>1</sup> and Yi-Yuan Shao<sup>1</sup>

## Abstract

With consideration of the sustainable development goals (SDGs) from the United Nations, ultrasonication is one of the green processing with an improvement of the physicochemical properties, such as morphology, gelatinization level, short-range and long-range ordered molecular structure. However, there were few studies demonstrated how did ultrasonic treatment influence starch granule morphology and physicochemical properties of high amylose maize starch. This study conducted semi-gelatinized Hylon V starch for different ultrasonication durations (5, 10, 20, and 30 min) at two temperatures (25 °C and 50 °C) to comprehend the impact on starch granule morphology, gelatinization level, short-range and long-range ordered molecular structure. The results showed that ultrasonication damaged the starch granule via scanning electron microscopy, increased the gelatinization level by differential scanning calorimetry, enhanced the short-range ordered molecular structure by Fourier transform infrared spectroscopy, but decreased the long-range ordered molecular structure by X-ray diffraction. Hence, ultrasonication damaged the morphology of starch granule and long-range ordered molecular structure by high temperature and pressure cavitation. We performed a picture of the impact of ultrasonication on starch granule morphology and physicochemical properties of high amylose maize starch.

**Keywords:** ultrasonication; high amylose maize starch; starch granule morphology; short-range ordered molecular structure; long-range ordered molecular structure

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<sup>1</sup> Department of Food Science, Nutrition, Nutraceutical Biotechnology, Shih Chien University