Important notes:

Do **NOT** write outside the grey boxes. Any text or images outside the boxes **will** be deleted.

Do **NOT** alter the structure of this form. Simply enter your information into the boxes. The form will be automatically processed – if you alter its structure your submission will not be processed correctly.

Do not include keywords – you can add them when you submit the abstract online.

Title:

Ultrasound changes the structure of starches are based on amylose /amylopectin ratio

Authors & affiliations:

Name and surname	*Institution/ Department, University, Country*
Minqian Zhu; Sushil Dhital	*Department of Chemical and Biological Engineering, Monash University, VIC 3800 Australia*

Abstract: (Your abstract must use **Normal style** and must fit in this box. Your abstract should be no longer than 300 words. The box will 'expand' over 2 pages as you add text into it.)

Preparation of Your Abstract

1. The title should be as brief as possible but long enough to indicate clearly the nature of the study. Capitalise the first letter of the first word ONLY (place names excluded). No full stop at the end.
2. Abstracts should state briefly and clearly the purpose, methods, results and conclusions of the work.

Introduction: Clearly state the purpose of the abstract
Methods: Describe your selection of observations or experimental subjects clearly
Results: Present your results in a logical sequence
Discussion: Emphasize new and important aspects of the study and conclusions that are drawn from them

Ultrasound treatment is gaining attention as a physical and green technique for starch modification; however, its effects remain unclear due to the combined influence of cavitation and thermal effects from bubble collapse.

This study investigates ultrasound effects on granular starches with varying amylose-to-amylopectin ratios and gelatinization degrees. Waxy maize starch (WMS, 1% amylose), normal maize starch (NMS, 26% amylose), and Gelose 80 (G80, 80% amylose) were sonicated (20 kHz, 1 h, 2250 J/cm^3) after being pre-conditioned to non-gelatinized (A: 50 °C), semi-gelatinized (B: 65 °C/85 °C), and fully gelatinized (C: 95 °C/140 °C) states using a Rapid Visco Analyser. Structural and physicochemical changes were characterized by light microscopy, scanning electron microscopy (SEM), differential scanning calorimetry (DSC), X-ray diffraction (XRD), small-angle X-ray scattering (SAXS), and size-exclusion chromatography (SEC).

Microscopy revealed granule swelling and merging, especially in semi-gelatinized starches with higher amylopectin. DSC showed a significant decrease ($p < 0.05$) in enthalpy (ΔH) post-sonication, and the double helix of ungelatinized starch was more easily disrupted. XRD confirmed unchanged crystalline types but reduced relative crystallinity, such as a 5.17% decrease in semi-gelatinized WMS. SAXS indicated reduced peak intensity at $q \approx 0.07$ Å^{-1}, particularly in ungelatinized starches. SEC results showed slight degradation of long-chain amylose in ungelatinized starch.

These results support that the cavitation effect of ultrasound disrupts weak starch structures. However, the cavitation effect is dependent on both the retention of granular structure (non-gelatinised versus semi-gelatinised starch) and amylose content. The high amylose is more protective towards the cavitation effect compared to normal and waxy starches. The study provides the scientific background towards the application of ultrasound as a promising non-thermal method to modify the starch structure