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# Ultrasonic assisted production of starch nanoparticles: Structural characterization and mechanism of disintegration

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**Abstract**

In this paper, the disintegration of starch (waxy and standard starch) granules into nanosized particles under the sole effect of high power ultrasonication treatment in water/isopropanol is investigated, by using wide methods of analysis. The present work aims at a fully characterization of the starch nanoparticles produced by ultrasonication, in terms of size, morphology and structural properties, and the proposition of a possible mechanism explaining the top-down generation of starch nanoparticles (SNPs) via high intensity ultrasonication. Our dynamic light scattering measurements have indicated a leveling of the particle size to about 40 nm after 80 min of ultrasonication. The WAXD, DSC and Raman have revealed the amorphous character of the SNPs. FE-SEM. AFM observations have confirmed the size measured by DLS and suggested that SNPs exhibited 2D morphology of platelet-like shapes. This morphology is further supported by SAXS. On the basis of data collected from the different characterization techniques, a possible mechanism explaining the disintegration process of starch granules into NPs is proposed.

Key words: Starch, nanoparticles, ultrasonication,

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