

Advanced Microscopy and Spectroscopy Techniques for Revealing Molecular Structure of Starch Granules

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Abstract: Starch is a naturally occurring most abundant plant polysaccharide which is the major source of carbohydrate and energy in human diet. In food processing and human nutrition, functional properties of starch plays a vital role and hence thorough understanding of structure and composition of starch is extremely important. Here, starch granules from potato, rice and corn were isolated and their molecular mechanism upon interaction with α - amylase were characterized through biochemical test, microscopic imaging and spectroscopic measurements. The micro-scale structure of starch granules were observed under optical microscope and an average size was found ranging from 1 to 100 μm . The surface topological structures of starches with micro holes due to the effect of α - amylase were also visualized under scanning electron microscope (SEM). The crystallinity was confirmed by powder X-ray diffraction (XRD) patterns and the chemical composition before and after hydrolysis of the starch granules by α - amylase was determined by Fourier transform infrared (FTIR) spectroscopy. We conclude from this study that the XRD spectra of native and hydrolysed starch remain same and thus suggests degradation occurs mostly in amorphous regions.

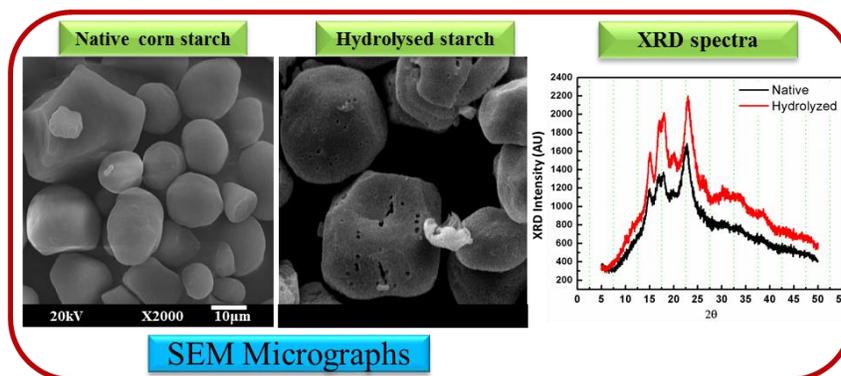


Figure: SEM images and XRD spectra of native and hydrolyzed starch.

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