Chemical force mapping of phosphate and carbon on acid-modified tapioca starch surface

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ABSTRACT

Surface chemical microstructure of hydrochloric acid hydrolyzed tapioca starch producing different amylase:amylopectin (Am:Ap) ratios were studied with scanning chemical force microscopy (SCFM). The chemical force probes were functionalized of two types with –OH (phosphate specific) and –CH3 (carbon specific). Lateral force trace-minus-retrace (TMR) images from –OH and –CH3 probes revealed changes in the phosphate domains and the carbon backbone for the varying acid hydrolyzed tapioca starch compared to that of the native tapioca starch. Scanning electron micrographs (SEM) showed different degree of the granule surface disruption before and after hydrolysis. The exterior structures of the acid hydrolyzed starch granules were chemically investigated with CFM to study the relationships of the surface molecular structures and the Am:Ap ratios.

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