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Effect of non-thermal plasma on physico-chemical, functional and rheological properties of rice starch

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• overcome the problems related to properties of native starch, it is subjected to physical, enzymatic and chemical modifications. Non-thermal plasma is considered as novel physical method for starch modification. The present work is aimed to study the effect of non-thermal plasma on the functional and rheological properties of rice starch at two different power levels (40W and 60 W). Depolymerization, crosslinking and etching caused by the reactive plasma species are the three important mechanisms responsible for the starch modification. By evaluating the amylose content, turbidity, pH, fat and water absorption, the changes occurred due to plasma treatment were assessed. There is decrease in amylose content and pH after the treatment. Water absorption capacity was increased due to incorporation of polar moieties (hydrophilicity) by plasma species on the surface of starch. The starch hydrolysis percentage was found to be decreased and this might be due to the decrease in pH and cross linking. DSC thermographs showed decreased in gelatinization temperatures and enthalpy after the treatment. Gel hydration properties and syneresis revealed that there was an increase in leach out of amylose molecules after the treatment. RVA analysis showed an increase in pasting and final viscosities. G' and G" moduli determination revealed that there was decrease in retrogradation tendency of starch gels. XRD revealed that there was no change in A-type pattern and decrease in the relative crystallinity due to depolymerization caused by active plasma species. Addition of functional groups (carboxylic and hydroxyl) were observed from FTIR spectrum. SEM showed formation of fissures due to etching caused by plasma species on the surface of starch granules. The changes occurred in the native starch could be due to cross linking and depolymerization of amylose and amylopectin chains. Thus, results showed that plasma treatment can be used as physical method for starch modification.

Biography

Rohit Thirumdas has expertise in the area of application of non-thermal plasma in food, particularly rice varieties and starches for more than 4 years and his Doctoral dissertation is also based on these studies. He has published 7 research papers and there are 4 research papers which are under review in peer reviewed international journals. He has presented his work at various international conferences held at Europe and USA.

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