

7th World Nano Conference

June 20-21, 2016 Cape Town, South Africa

Comparison of morphological properties of xylan nanohydrogels produced by enzymatic and chemical methods

Annie Chimphango

Stellenbosch University, South Africa

Xylan solubility properties were modified using enzymatic and chemical methods to produce nanohydrogels. The enzymatic modification involved recombinant α -L-arabinofuranosidase that selectively removed arabinose side chains whereas the chemical method involved the coacervation through neutralization process that involved hydrochloric acid and sodium hydroxide. Furthermore, the effect of time, xylan concentration and presence of plasticizers, thus polyethylene glycol 1000 (PEG 1000), polyoxyethylene (20) sorbitan monolaurate [Tween 20], on particle size, surface charge and stability was investigated. The mean particle diameter, zeta potential, were measured by a Zetasizer Nano ZS90 that used Dynamic light scattering. In addition, the morphological profile of the particles was assessed using a microscope equipped with a micrometer grid, connected to a camera. The sugars from the enzymatic hydrolysis were analyzed using the High Performance Liquid Chromatography, Doinex Ultimate 3000, equipped with Prevail Carbohydrate ES analytical column, and ELS2100 Evaporative Light Scattering detector. Tween 20 plasticizer prevented aggregation of the particles. Over 80% of the particles formed using the chemical method attained a mean diameter ranged from 153- 853 nm and a zeta potential of -28mV. On the other hand the nano particles with sizes as low as 21 nm were produced by enzymatic method with Zeta potential of close to -20 mV. The presence of plasticisers during formation of nano particles to some extent prevented aggregation behavior of the nano-particles. In enzymatic production, size distribution was dependent on xylan concentration. These results demonstrates the potential to diversify industrial application of xylan.

Biography

Dr. Annie Chimphango is a Senior Lecture at Stellenbosch University, Department of Process Engineering. She holds a Master Degree in Agricultural and Bioresource Engineering from McGill University, Canada and a PhD in Chemical Engineering from Stellenbosch University. She has published papers in reputable Journals on enzymatic modification of hemicelluloses to form nano-hydrogels and their application in pulp and paper and their use as encapsulation matrix for bioactive substances. Her research focus is on value addition to agro-residues and process waste through production of high value materials such as hydrogels and nanocellulose using biological methods.

achimpha@sun.ac.za

Notes: