



## Properties of Infrared Heat-Moisture Treated Amylose-Lipid Complex Nanomaterials

Njabulo Maphumulo, Naushad Emmambux

University of Pretoria, Pretoria, South Africa

### Abstract

Nanotechnology involves the study and use of materials at nanoscale dimensions of 100 nm. This nanoscale length results in materials exhibiting physical and chemical properties that are significantly different from the properties of macroscale materials composed of the same substances. However, there are limited food compatible nanomaterials to be used in foods, or most of them are not considered as an edible or clean label. The amylose lipid complex (ALC) nanomaterials were produced using maize starch with added stearic acid (1.5% w/w) pasted for a prolonged period of 130 min at 91. The nanomaterial was infrared heat moisture treated for 1, 2 and 3 hours at 110 with 25% moisture content as a continuous method. Repeated infrared heat moisture treatment for three days at 1 hour each day with 25% moisture content at 110 using different cooling systems after the daily infrared treatments (room temperature, refrigeration temperature and liquid nitrogen) for 24 hours. The differential scanning calorimetry (DSC) for treated ALC nanomaterials with heat moisture treatment followed by cooling systems showed higher peak temperature and presence of type II ALC as compared with untreated ALC (control), that only had type I ALC. WAXS showed that treated ALC nanomaterials with heat moisture treatment followed by cooling systems had increased relative crystallinity as compared to untreated ALC (control). The increased relative crystallinity of treated ALC nanomaterials was related to the transformation to type II ALC (as observed by the DSC and WAXS). Heat moisture treatment resulted in increased crystallinity of isolated amylose lipid complex nanomaterials. Isolated ALC nanomaterials with increased crystallinity can be produced from infrared heat moisture treatment to be used in biodegradable packaging systems.

### Biography: Njabulo Maphumulo

Njabulo is a recent MSc graduates from University of Pretoria, working on biopolymer to produce recyclable and edible food packaging material.