VISCOELASTICITY, MICROSTRUCTURE AND MOLECULAR PROPERTIES OF CEREAL PROTEIN MELTS

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Development of new materials to replace synthetic polymers is currently an important challenge in the light of the global efforts to reduce carbon dioxide emissions. Specifically applications involving disposables is a suitable area for biodegradable materials from renewable resources. Cereal proteins have a broad range of functional properties suitable for materials applications due to their unique structure such as mechanical and barrier properties and release functionality Cereal proteins also have the advantages of being hydrophobic, thermoplastic, abundant, relatively inexpensive and they are biodegradable.
In this work the melt properties of the cereal proteins pennisetin and zein were compared. Zein is the prolamin protein of maize and is available in large amounts from by-products of the biofuel industry. Pennisetin is the corresponding prolamin protein from pearl millet, which is one of the most draught tolerant crops thus important in dryer conditions resulting from global warming. The molecular data of the proteins was obtained and correlated to the melt microstructure and physical properties. Dynamic rheological properties, molecular characterization through SDS PAGE and transmission electron microscopy were carried out in order to study the effect of formulation on the rheological behaviour of the protein based melts. Pennisetin melts presented a complex thermorheological behaviour, which could depend on changes in the physical microstructure with temperature. Contrary, zein melts presented a simpler thermorheological behaviour than pennisetin melts. Pennisetin based melts had a predominantly more elastic microstructure, and moreover, a distinct influence of the plasticizer system can be observed on the molecular weight distribution data of zein based melts.