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Low environmental impact packaging: From pulp moulded to bioplastic

In recent years, non-wood fibres such as straw (wheat, rice and barley), grass, bamboo and oil palm empty fruit bunches have been used as alternative fibre sources for pulp moulding products. Such fibres are normally treated as agricultural wastes and burned or composted, the advantages of using such fibres for packaging solutions include: Economical, readily available, good processing characteristics and environmental benefits. This talk will summarise research outcomes from a range of past and current projects undertaken at the BioComposites Centre (BC). A key challenge for bio-based materials is to overcome the barriers to wider commercial adoption. The talk will also look at some of the barriers that are hampering the development of biopolymer products. Factors such as processing cycle time and high raw material costs will be highlighted alongside the environmental benefits of using biopolymers. A critical area of research that is emerging is the potential to increase shelf life by using moulded products or bio-based polymers. Increasing shelf life could be a major factor in helping fully or partially to replace plastic packaging in the near future. Performance of pulp moulded packaging is influenced by a number of interrelated factors which can be broadly separated into three areas: Fibre characteristics, method used to form the moulded product and surface properties. Through the safe biopack project, partners in Malaysia and the UK are collaborating to tackle all of these issues and improve packaging products made from a variety of different raw materials. BC have contributed by assessing alternatives to the established method of chemical pulping of empty fruit bunch fibre. By using no chemicals but just controlling the refining stages we have successfully produced a fibre size distribution suitable for the production of moulded products, thus helping to reduce the environmental impact of the whole process. In terms of surface properties it is well known amongst food suppliers and retailers that fresh products, particularly soft fruits and mushrooms are very sensitive to the type of material used in their packaging. In the case of mushrooms if the packaging is too hydrophilic, moisture will be transferred to the fibre based packaging which can lead to loss of pack strength and consequently a degradation in food quality as the mushrooms then dry out. However if the packaging is hydrophobic then the mushrooms sweat and because the moisture cannot escape they degrade quickly. By adding food contact approved waterproof additives to pulp moulded products the degree of hydrophobicity of the surface can be controlled so that both water barrier performance and breathability can be tailored to maximise and extend product life.

Biography

Robert Elias is the Director of the BioComposites Centre at Bangor University with a staff of 26 Scientists. The centre was established in 1989 which works with companies to develop new technologies based on the use of sustainable materials. The centre has state of the art facilities including pilot scale equipment that enables companies to demonstrate their ideas by developing prototype materials. He has major interest in the development of bio-derived materials that reduce global warming potential and has an industrial and academic background in natural fibre production. His expertise includes wood based panel production, biomass extraction, chemical composition and product development. His current research interests include bio refining, production of bioplastic products, extraction of value added molecules from plant materials, utilisation of wastes and agricultural co-products for packaging and construction applications.

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