

THE USE OF BIOPLASTICS IN LIGNOCELLULOSIC COMPOSITES

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ABSTRACT

Increasingly, we are becoming aware of need for a more sustainable approach to the use of the World's resources. Nevertheless our demand for materials, for building, transport and a host of other applications, continues to grow. This is leading to the search for new sustainable materials and in recent years there has been a significant amount of interest shown in the potential of natural lignocellulosic fibres as reinforcement in polymer matrix composites. This has resulted in the commercialisation of products made from fibres such as flax and hemp in automotive applications as well as products, manufactured from wood fibre, destined for the construction and decking markets. Almost without exception, the common feature of these materials is that they incorporate polymer matrices derived from finite fossil reserves. Whilst these may be recycled polymers, with the concomitant benefits of waste reduction, they are in the main relatively inert and do not biodegrade readily. Composite materials manufactured from these materials thus face problems associated with end of life disposal.

In parallel with the resurgent interest in the use of lignocellulosic fibre in composites, are the developments taking place in the field of resins and plastics derived from non-fossil based renewable resources such as industrial crops. Much of this work has been inspired by the desire to produce biodegradable plastics from renewable resources to replace the current range of products based on finite resources. These developments offer up exciting opportunities for composite materials based upon a combination of biopolymers and lignocellulosic fibre.

The BioComposites Centre has, over the past decade or so, been actively involved in the development of both bio-origin resin systems and composite materials based on lignocellulosic fibres. Recent developments in the Centre's bio-resins work have led to a patented technology that is currently being commercialised and which is offering exciting opportunities for composites based on natural fibres. In parallel with this work, the Centre is also actively aiming to develop (natural) fibre based composite materials, with true structural potential, utilising bio-derived polymer matrices. A brief overview of these so-called bio-composites will be provided, together with results from one recently completed and one ongoing project. Both these focus on the development of lignocellulosic fibre based bio-polymer composites.