

World Congress on  
**BIOPOLYMERS AND BIOPLASTICS**  
&  
World Congress and Expo on  
**RECYCLING**

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### Biopolymers and the circular economy

The world at large seeks to adjust the business models and materials used in manufacturing to meet the challenges which globally we must address. These include Climatic Change and Plastic Waste in the Oceans. There is a strong drive towards materials from a sustainable source and to implement the principles of the circular economy. The circular economy idea is essentially an economy which is restorative by design. It is based on the concept that material flows are captured and re-used while the biological flows are designed to reenter and replenish the natural world safely. The bioeconomy is an essential part of the circular economy. We are not able to operate the circular economy without the bioeconomy, because it is impossible to sustain an economy without any new resources being added. Now biomaterials have attracted attention as they would degrade more rapidly than the everlasting plastics in the oceans. Of course this simply overcomes the lack of a circular economy for such materials. Much of the current

debate in Europe has focused on the consumer whereas of course the vast majority of materials are used in industries and agriculture. Within the Centre for Rapid and Sustainable Product Development we are actively exploring how to use all types of naturally occurring materials. Central in our thinking is the untapped potential of rosin, a molecular material which can be extracted from the resin obtained from particular types of pine trees prevalent in Portugal but many other parts of the world. We are using the waste streams from agriculture, from mineral processing and from industrial processing coupled with rosin to produce composite materials with highly attractive properties with applications in areas where traditional thermoplastics and thermosets are widely employed. We will present case studies taken from the work at CDRSP to illustrate the potential for this type of composite material. We present these studies in the wider context of mitigation of Climatic Change and the development of the circular economy.

### Biography

Geoffrey Mitchell carried out his doctoral studies at the University of Cambridge and postdoctoral studies at Hokkaido University Japan, and the University of Cambridge. He is currently the Vice-Director of the Centre for Rapid and Sustainable Product Development, Institute Polytechnic of Leiria, Marinha Grande, Portugal a centre of excellence in the field of sustainable manufacturing, tissue engineering and regenerative medicine. He is also Emeritus Professor at the University of Reading UK. He has published over 300 papers in international journals and 6 books. He is an editorial board member of several international journals.

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