

Bioplastics – which ones to watch

Conventional plastics, such as polyethylene (PE), polypropylene (PP) and polyethylene terephthalate (PET), are very slow to degrade. Therefore, when these plastics enter the environment as waste they can remain there for decades.

The Organisation for Economic Co-operation and Development (OECD) 2022 report, *Global Plastics Outlook: Policy Scenarios to 2060* says that plastic pollution driven by rising population will increase almost three-fold by 2060 without “radical action to curb demand, increase produce lifespans and improve waste management and recyclability”. The organisation’s secretary general, Mathias Cormann, added: “If we want a world that is free of plastic pollution, in line with the ambitions of the United Nations Environment Assembly, we will need to take much more stringent and globally co-ordinated action.”

Solutions to this problem are needed. One possible solution is to replace conventional plastics with plastics that are biodegradable or “bioplastics”.

The main types of bioplastics currently are butylene-based polymers, polylactic acid (PLA), polyhydroxyalkanoates (PHAs) and starch-based bioplastics. At Appleyard Lees we have analysed patent filing trends in these types of bioplastics to identify progress in their development.

Butylene-based polymers

The majority of patent filings for butylene-based bioplastics during the 2000s originated in Japan. However, towards the end of the 2000s patent filings for these polymers became more evenly geographically distributed; a trend which has continued over the past decade. Other jurisdictions experiencing significant filing activity in recent years include South Korea, the US, China and Taiwan.

Overall, the top five filing jurisdictions saw relatively steady numbers of filings relating to butylene-based bioplastics until about 2018, when a sharp upward trend began. The significant increase in innovations relating to butylene-based bioplastics in the last few years may indicate an increased demand from consumers for bioplastics that have similar properties to conventional plastics in areas such as packaging, for example. Butylene-based technology stands out from other types of bioplastics as the leading area of current innovation.

Polylactic acid (PLA)

Again, Japan was the source of the majority of PLA-related patent filings in the early 2000s. However, filings from Japan have declined gradually since about 2008. Other jurisdictions of interest include South Korea and the US, where patent filings around PLA have remained relatively constant over the past 20 years.

Overall patent filings relating to PLA from the top five jurisdictions have shown a steady decline since a peak in about 2008, indicating that companies have moved away from this technology.

Polyhydroxyalkanoates (PHAs)

Japan, Korea and the US have generated the largest numbers of PHA-related patent filings over the last two decades. Filing numbers have notably increased since 2015, suggesting a renewed interest in PHAs.

Starch-based bioplastics

In contrast to the trends seen for the other types of bioplastics, the US has been the biggest source of patent filings relating to starch-based polymers over the past 20 years. Even so, the number of filings per year in the US has fallen since 2014. In other jurisdictions, such as Europe, South Korea and Japan, patent filings have also been lower over the past 10 years than the preceding decade. We could speculate that this signifies a lack of interest – or at least reduced interest – because starch-based bioplastics have poor properties compared to other bioplastics. However, there has been a notable increase in filing numbers since 2017 and it will be interesting to see if this continues as the technology improves.

At Appleyard Lees, we have considerable experience in working with green technologies and last year we published the first edition of our *Inside Green Innovation* report. An extended version of this article will feature in the second edition of our report, due to be published in the coming months.

If you would like advice or information on how to obtain patent protection for your green innovations please contact Kate Hickinson, Partner, Appleyard Lees.

