

Inventions & Innovators spearheading Sustainable Plastics

A view across the enabling technologies of Bio-degradable polymers, Bio-based polymers, & Sustainable Adhesives.

An estimated 80% of the 8.3 Bn tonnes of plastics produced globally since the 1950s has ended up in landfills or escaped into the environment. This comes at the detriment of the global ecosystem which is bearing the long-term consequences of the non-biodegradable nature of most plastics. Since 2015, the UN is looking to directly tackle the issue by setting out Sustainable Development Goals (SDGs) to promote responsible consumption and production patterns, as well as improve living conditions on land and below water. Our ambition is to provide an objective perspective of the global leaders and innovators contributing to accomplishing the SDGs, through the utilisation of published patent data.

In this update on innovation being made in critical technologies spearheading sustainable plastics, we provide our view of the leading innovators to watch based on recent published inventions and overall weightings to enabling technologies. The tech areas covered include Bio-degradable polymers, Bio-based polymers, & Sustainable Adhesives.

The World's Leading Sustainable Plastic Innovators To Watch



Cipher view of the world's leading innovators to watch based on recent publications and overall weighting of inventions to enabling sustainable plastic technologies: Bio-degradable polymers, Bio-based polymers, & Sustainable Adhesives

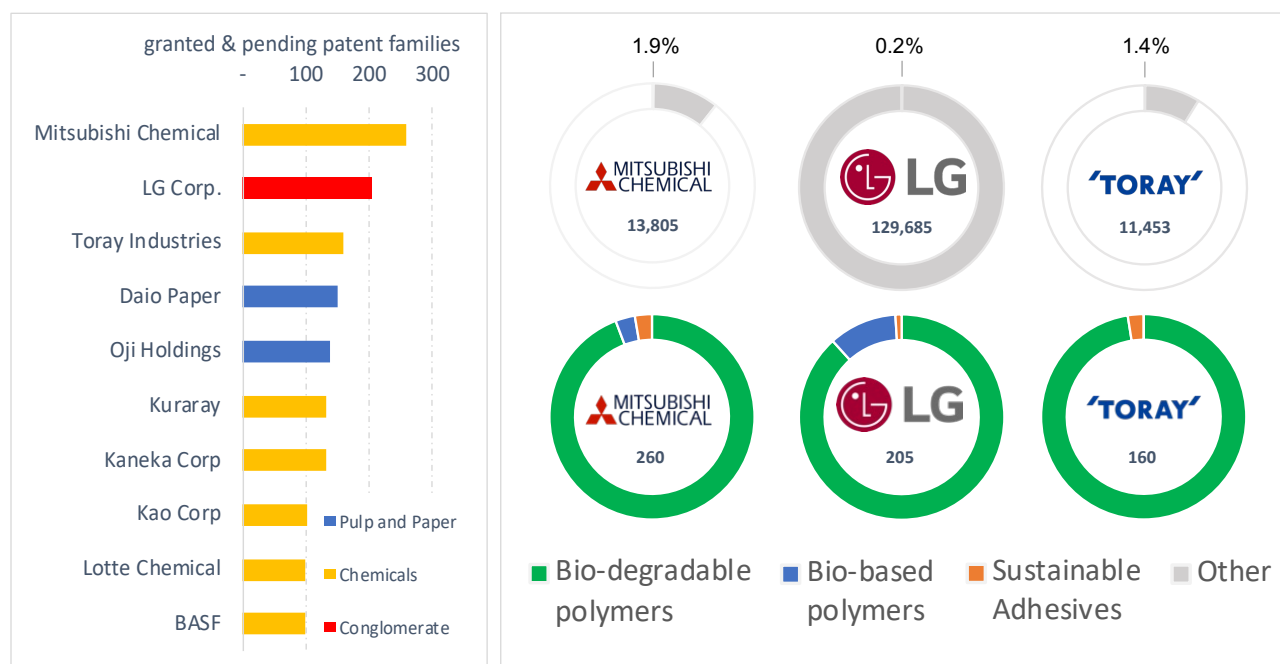
Cipher Sustainability Insight

At Cipher, we support many of the world's largest organisations in scoring and benchmarking on sustainability innovation specific to the energy transition, climate change, the circular economy, clean water, health & wellbeing and more. For information on how you can access critical insight on sustainable innovation specific to your business and industry, please get in touch.

Top invention owners worldwide in alternative sustainable plastic technologies include several Japanese Chemical and Pulp & Paper giants. Bio-degradable polymers represents the overwhelming majority tech area.

Sustainable plastic tech accounts for only a small portion of the published inventions owned by the top three invention owners Mitsubishi Chemicals, LG and Toray.

Top Invention Owners: Sustainable Plastic Technologies



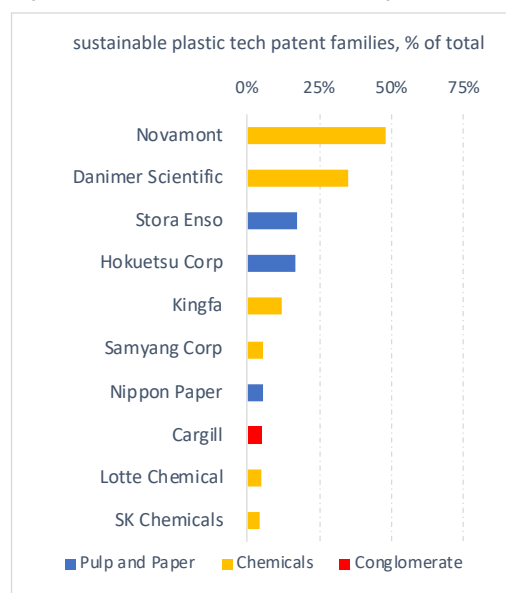
Patent families classified according to technologies using CIPHER's internal sustainability classifiers Global excluding China only patent families The extended list of 50 top owners is included on page 4.

Sustainable Plastic Tech Weighting: patent families owned as a percent of the total for each top owner

Sustainable plastic technologies represent a minor fraction of the top owners published inventions. For each of the top 10 owners, these technologies constitute less than 5% of their total portfolios. To see which companies place a strategic importance towards sustainable plastic innovation, we rank the top 50 owners by percent exposure.

The leaders in this regard are Bioplastic-oriented companies - Novamont and Danimer Scientific and Finnish Bioeconomy leader Stora Enso. Sustainability is at the forefront of each company's strategy, with the overall aim of reducing pollution from traditional plastics. 48% of Novamont's 112 active patent families are dedicated to sustainable plastic alternatives, followed by Danimer at 35% and Stora Enso at 17%. Interestingly, Danimer's acquisition of Novoner in 2021 increased their Bio-based polymer tech area by ten-fold.

Similarly, the top 10 largely features Chemical and Pulp & Paper companies specifically, with the exception of Cargill a US-based Conglomerate.



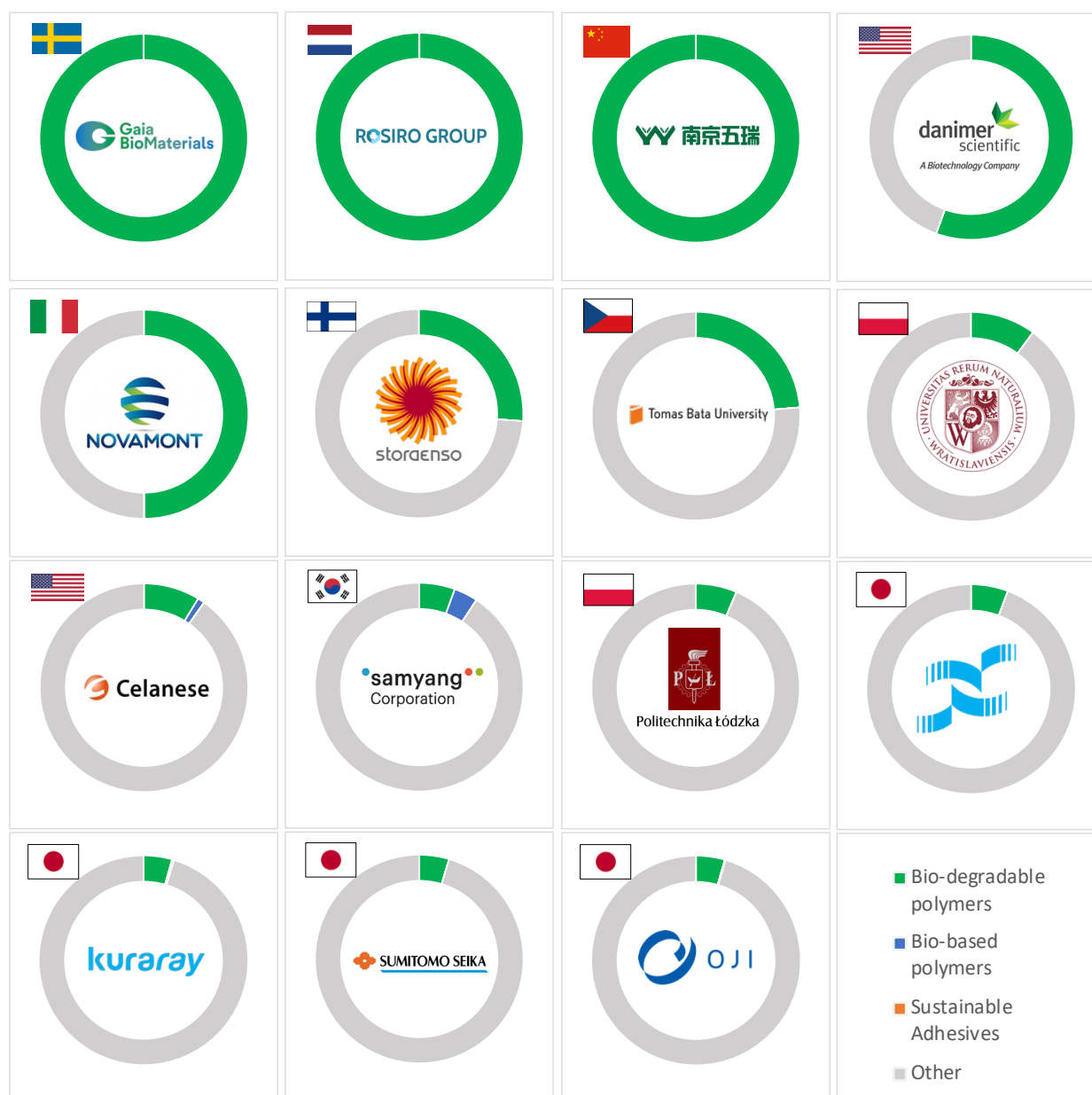
The extended list of 50 top owners by sustainable plastic tech weighting is included on page 4.

The leading sustainable plastic weighted innovators based on recent patenting activity by scale and overall exposure; Bio-degradable polymers the dominant technology enabler

These are the companies that we view as leaders to watch in sustainable plastic innovation. The full list is generated by screening those organisations with the most inventions published across the enabling technologies from start of 2021 to date and where recent innovation is relatively more weighted to those technologies over others.

The World's Leading Sustainable Plastic Weighted Innovators To Watch

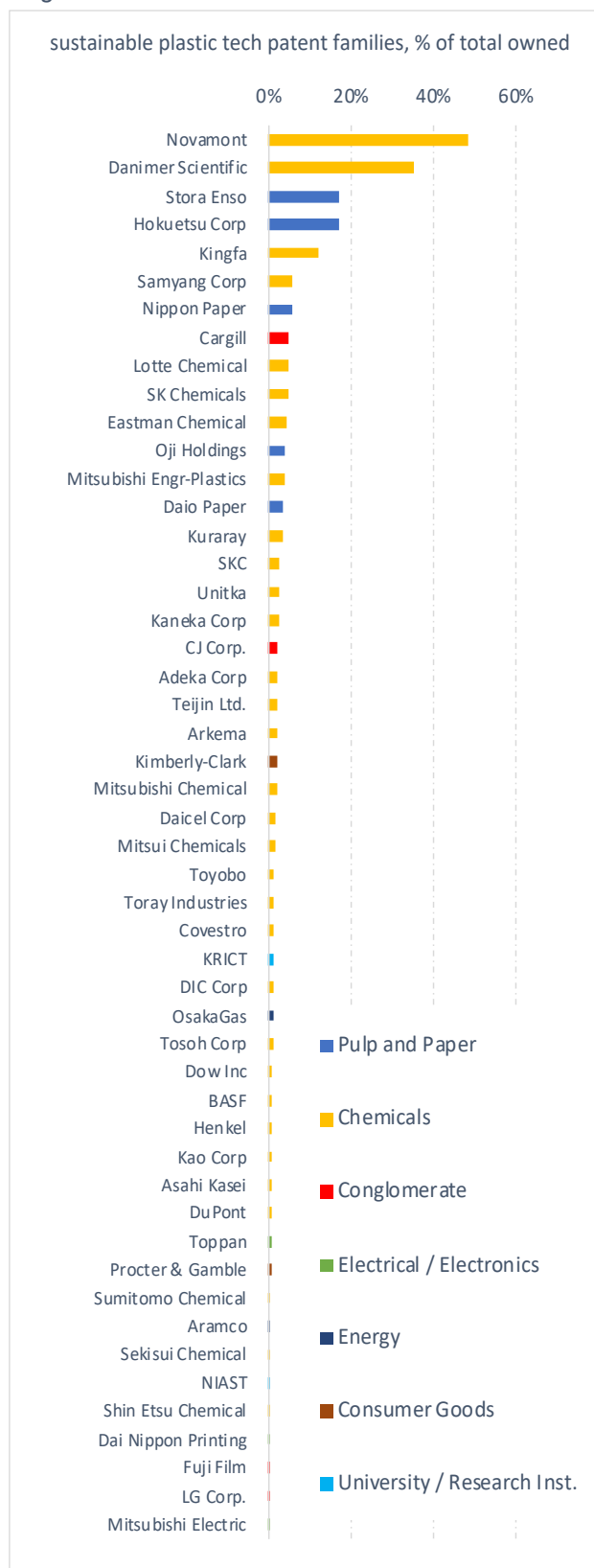
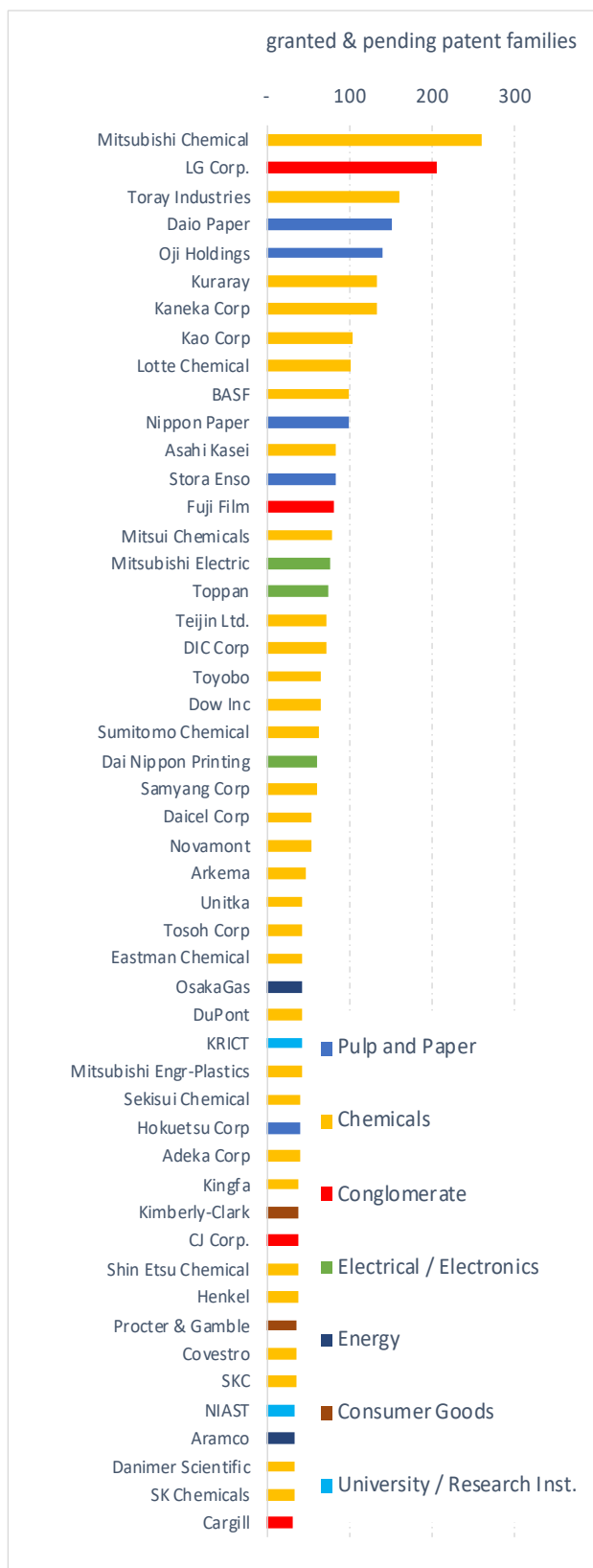
Technology breakdown of published inventions 2021 – 2022 (Nov)



Cipher view of the world's leading innovators to watch based on recent publications and overall weighting of inventions to enabling sustainable plastic technologies: Bio-degradable polymers, Bio-based polymers, & Sustainable Adhesives. The extended list of 50 top innovators and their sustainable plastic tech weighting is included on page 5.

Top Invention Owners: Sustainable Plastic Tech patent families owned

Top Invention Owners, Sustainable Plastic Tech Weighting: % of patent families published to date relating to Sustainable Plastic, by organisation



Top Innovators: Sustainable Plastic Tech
patent families published 2021 – 2022 (Nov)

Top Innovators Sustainable Plastic Tech
Weighting: % of patent families published relating to Sustainable Plastic 2021-2022 (Nov), by organisation

