New data from Malvern Instruments (UK) demonstrate how rheological methods can be used to investigate the speed at which biopolymers, such as polylactic acid (PLA), whose low environmental impact is a defining feature, will biodegrade and compost within landfill. The results show how rheological measurements made in the laboratory provide information about the kinetics and thermodynamics of polymer breakdown, helping accelerate the development of products that meet defined biodegradability criteria. The work is presented in a recently recorded webinar entitled ‘Using rheology to assess the biodegradability and compostability of polylactic acid’ and is freely available for download from the Malvern website.

The use of PLA is growing as its cost and performance come closer to traditional petroleum-based commodity polymers. Produced from crops, PLA offers the advantage of lower environmental impact and biodegradability is a key element of this. The lifecycle analysis of PLA, in applications such as food packaging, relies on understanding the mechanisms of product degradation, post use, and most importantly, the factors that will accelerate it, or indeed slow it down.

Rheological tests are very sensitive to small changes in the microstructure and molecular weight of polymers and are widely used in their characterisation. In the presented study, melt viscosity measurements were successfully applied to track the progressive reduction of molecular weight caused by degradation which proceeds via a process of hydrolytic chain scission. By studying PLA samples held under different conditions it is possible to assess the impact of environmental factors on the rate of polymer breakdown. The resulting information supports the optimisation of polymer properties across the product lifecycle.