Editorial corner – a personal view

Polyolefins for the 21st century

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After some decades of success, polymers have been going through a hard time recently. For the first time since the oil crisis of the early 1970s, global production decreased in 2008 as a result of the economic crisis. At the same time, public perception of ‘plastics’ deteriorated, with critical views on issues like the release of endocrine disruptors, littering and waste.

While some of these arguments may be justified, many remain superficial like the quarrel about single-use plastic shopping bags, where a total ban in Italy was the latest important news. The efficiency of these polyethylene (PE) bags is high in one-way systems already: In Austria, the amount of bags used per capita and year equals the energy content of just 0.7 litres of diesel fuel. In practice many of these bags are being re-used, and a comparably strong paper bag would have to be re-used about ten times more often to arrive at the same ecological footprint. But polyolefins can do far more, in terms of lifetime, performance and energy efficiency. Bimodal high and medium density PE grades have revolutionized the water and gas distribution system, being light, corrosion-resistant and the safest choice in case of earthquakes. ‘Smart’ electrical power grids allowing the increased use of renewable energy sources call for high-performance insulation systems, and crosslinked LDPE will remain the material of choice. Efficient individual mobility requires cars combining low weight and high passenger safety, and only polymers will be able to fulfil that need at reasonable cost, with high-impact polypropylene (PP) copolymers at the frontline of development. And polyolefins have certainly not reached their theoretical performance limit yet. Through continued

research on the structure-property relations governing the performance of PP and PE, researchers in academia and industry contribute to a continuous expansion of the application range. Recent examples of previously impossible applications are replacement of glass-fibre reinforced polyamide for air-intake manifolds in cars by an advanced PP grade, and substitution of plasticized poly(vinyl chloride) (PVC) by advanced super-soft PP grades for medical applications. While future achievements will depend upon the availability of new catalyst generations giving better control over molecular weight distribution and comonomer incorporation, developments in processing technology will support this advance.

In 2008, 46% of the plastics processed in Europe were polyolefins, corresponding to a volume of 22.3 Mt/a. About 6% of the total crude oil consumption is employed for polymer production – and, from an efficiency perspective, that is a far better idea than just refining and burning the oil. While adaptation to new resources will be required in the long run, it remains to be seen whether bio-based and biodegradable polymers can challenge polyolefins for major market shares, given the mechanical and optical limitations exhibited by these materials so far.

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