Editorial corner – a personal view

Automotive plastics: What future is there for polymers in tomorrow's electric and autonomous vehicles?

P. Krawczak*

IMT Lille Douai, Institut Mines-Télécom, Univ. Lille, Centre for Materials and Processes, France

Polymers have become one of the key materials to manufacture high-performing, lightweight, fuel-efficient, safe, and affordable cars. Accounting for roughly one third of the parts in a vehicle, plastics meet traditional automotive requirements rather well: high specific mechanical properties, impact, thermal and chemical resistance, customization capabilities, easy formability, relatively low cost, and recyclability.

However, the growing market for electric vehicles and the advanced digital technologies of autonomous driving are likely to redefine the use of polymers in the auto industry. Fortunately, polymers fit well with this new era. Some of their assets are more than ever crucial: molding parts with complex geometries or multiple functions integration, noise and vibration damping, and weight saving.

Electric vehicles emitting less heat than internal combustion engine cars, a broader range of commodity plastics (e.g., polypropylene) could be used in place of costly engineering plastics (e.g., polyamides).

In addition to being a light source, headlamps of self-driving cars will integrate electronics and sensors, e.g., lidars, radars and cameras, paving the way for advanced polymers able to warrant optical performance (light diffusion, transmission, colour) and heat management (enhanced importance of flame retardancy, thermal conductivity). Polymers can prevent the various waves emitted by the sensors from being disrupted by a barrier object (so-called ghost effect); hence, they are a suitable solution to cover and hide unsightly sensors without impeding radars with any shielding effect.

Thanks to transparent materials like polycarbonate, a potential candidate for replacing glass in the windows and windscreens, automotive cockpits could be equipped with large touchscreens and smart surfaces displaying images. Besides, electroactive (*i.e.*, ionic electroactive, liquid-crystal, piezoelectric, ferroelectric) polymers, such as polyvinylidene fluoride and potentially piezoelectric polylactic acid, might revolutionize acoustic speaker systems thanks to the integration of vibrating surfaces in dashboard or headrests acting as a resonance chamber. With the development of carsharing, there is also a need for sensory-appealing polymers formulated to be dirt-repellent or easy to clean, durable, and scratch-resistant (also in soft-touch surfaces).

At last, polymers have a role to play in the next-generation batteries as membranes, separators, electrolytes and electrode compounds, a field where research efforts are intensive.

Thus, no doubt, polymers have the potential to meet the ever-more-demanding requirements of the reshaped automotive market.

Prof. Dr. Patricia Krawczak
Member of the International Advisory Board

*Corresponding author, e-mail: patricia.krawczak@imt-lille-douai.fr
© BME-PT