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Editorial corner – a personal view

The new challenge of green tires for the electric vehicles

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The fast development of electric vehicles (EVs) is attracting more and more attention. Many countries plan to ban conventional petrol cars within the next twenty years. Public opinion supports these policies because they gradually reduce greenhouse gas emissions. Unlike gasoline cars, EVs have higher acceleration and less noise pollution from the engine but increased weight from the battery (https://doi.org/10.1016/j.tej.2015.11.011). Accordingly, new challenges to EV tires are emerging. The high instantaneous torque of EVs leads to higher tread wear. Long travel distances require low rolling resistance and lower tire weight. In addition, EV tires require low road noise.

To meet these new requirements of EV tires, we need to adjust the tire structure and materials. Reinforcement layers: traditional cars mainly use steel cords for the reinforcement layers. These steel cords are much heavier than rubber composites. Organic fibers with high strength, such as aramid and polyimide fibers (https://doi.org/10.1002/app.49733), can be partially used in the belt layer and carcass layer to reduce tire weight. The adhesive strength of fiber/rubber composites also should be enhanced. The light tires provide more driving ranges for EVs. Tread patterns: the tread patterns' improvement is more important than that in tread rubbers to reduce road noise (https://doi.org/10.1016/j.apacoust.2020.107617). The novel patterns can be designed according to the acoustic theory. Rolling and abrasion resistance: it is challenging to balance these two properties. The traditional method for improving abrasion resistance is to increase the tensile strength and modulus of the tread rubber, but this leads to an increase in rolling resistance. Therefore, researchers need to rationalize the rubber formula and manufacturing process. In addition, some novel fillers, such as graphene and carbon nanotubes, significantly increase the modulus of rubber composites. A reasonable combination of different fillers can balance these two properties (https://doi.org/10.5254/rct.21.79928). The fine dispersion of the hybrid fillers and the strong interface between novel fillers and rubber molecules should be ensured during the manufacturing process. In my opinion, these novel technologies have the potential to be realized in EV tires and contribute to making transport more environmentally friendly.

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