

Fluoropolymers win the race to modernise sports – the Formula E case study

Fluoropolymers, as a core component of batteries, have a key role to play in the growth of Formula E, specifically, in the development of cars. New generation racing vehicles, (Gen3), require the highest-performing lithium-ion batteries, capable of ultra-high-speed charging during the race, to provide an additional power boost. The fast-paced Formula E races would not be the same without fluoropolymers!

Today, with climate change and the green transition on top of global leaders' agendas, no sector can escape public scrutiny, including sports.

Motorsports specifically have undergone considerable change within the past decade. On our roads, cars powered purely by petrol-guzzling internal combustion engines are becoming more of a rarity as hybrids and electric power take a more central role. The world is becoming more aware of the need for the green transition, and racing championships are only too eager to become part of the solution, rather than the problem. As such, batteries and electric powered solutions are increasingly being used.

Perhaps it comes as no surprise given their critical role in enabling hybrid and electric vehicles, but fluoropolymers play a vital role in the race towards greening up motorsports, thereby ensuring high-performance and long-lasting batteries for this elite sport.

Batteries, the key driver of the green transition

One of the biggest technological innovations of this century concerns batteries. In the past, we knew batteries as small and cylindrical objects used to power up our home appliances. Nowadays the world is seeing the development of much larger batteries, used in a number of greener technologies.

In the automotive sector, batteries are being increasingly used to power up electric vehicles (EV). And this number is only set to grow: the 2021 BloombergNEF's Electric Vehicle Outlook¹ predicts that by 2030 EV sales will reach nearly 60% of the total car sales.

Technological innovation has, over the years, allowed incredible results in terms of battery performance. Currently, the average battery energy density rises 7% per year, granting each year better performing and longer-lasting batteries. These innovations could not take place without fluoropolymers and their unique combination of properties, improving energy efficiency and resistance.

Fluoropolymers, an irreplaceable component of batteries

Fluoropolymers are used in a wide variety of battery components. One of the commonly used fluoropolymers is polyvinylidene fluoride (PVDF), serving as an electrode binder and

¹ <https://about.bnef.com/electric-vehicle-outlook/>

separator coating in lithium-ion batteries, providing interconnectivity within each electrode, facilitating electronic and ionic conductivity, increasing the cell manufacturing productivity and the cell safety. Fluoropolymers have unparalleled cohesive and adhesive properties under high voltage, allowing for closely packed cathode active materials for high density electrodes. Thanks to PVDF, different battery components can be packed more closely together, improving the energy efficiency of a single unit and helping reduce overall size.

Fluoropolymers also offer high durability, flexibility and other exceptional mechanical properties when used in separators and gaskets, helping resist the harsh conditions faced within a lithium-ion battery. This dramatically improves performance, as well as the lifespan of batteries, which are increasingly used in applications that require a guaranteed and dependable level of output.

The alternatives to lithium-ion batteries are lead acid batteries, which do not contain fluoropolymers. These offer reduced performance notably in terms of energy efficiency because a lower proportion of the energy stored in lead acid batteries. In addition, lead acid batteries are heavier resulting in reduced functionality and increased energy consumption compared to lithium-ion batteries.

Formula E cars: sustainably fun!

"Formula E helped make sustainability 'cool' by bringing the racing action directly to the city centres and reaching a young, urban and modern target group"

Nico Rosberg, Formula 1 World Champion and Sustainability Entrepreneur

Traditionally, sports have always reflected societal and cultural shifts and innovations. This continues to be true today. With the world rapidly evolving and moving towards a net zero economy, the sports sector is joining the movement.

Formula E was created in 2011 by Alejandro Agag and FIA President Jean Todt to serve the dual purpose of bringing races back to the cities while demonstrating that sustainability can also be achieved in a fast-paced and adrenaline-fuelled sport.

For those of you that are not familiar with it, Formula E is an international championship comprising fully electric single-seater cars. Formula E races take place in the streets of the world's most iconic cities, like Montecarlo, to showcase that electric vehicles can provide the same adrenaline rush as Formula 1 combustion vehicles.

When Formula E kicked off its first championship season in 2014, it coincided with a growing mainstream appreciation for electric mobility, as well as fledgling concerns over climate change and emissions. In the meantime, Formula 1 was coming to the end of its first season with hybrid powertrains, but Formula E offered automakers the scope to be involved in the world's first all-electric racing championship.

Through the involvement of sponsors and partners, Formula E is not simply changing attitudes within motorsport. The reach of its sustainability and alternative propulsion systems messaging is transcending the motorsport and automotive sectors and infiltrating other industries, with several key sectors sponsoring races to be a part of the change.

Sustainability is becoming a greater area of focus across motorsport, and this can be predominantly attributed to the successful rise of electric power.