Chips for the road

Sales of electric vehicles are surging, but the technology faces challenges in terms of the development of an appropriate charging infrastructure and the ongoing global chip shortage.

Last month, we announced that the future of transport was the theme of our 2022 technology of the year. Road transport is the dominant source of carbon dioxide emissions from transportation, and we thus focused on key technological challenges in the future of road transport. In this issue of *Nature Electronics*, we continue this exploration with a Comment article from Khurram Afridi at Cornell University on electric vehicle charging infrastructure.

Transitioning to a more sustainable road transport system in the next decade or so will require the widespread adoption of electric vehicles. This, in turn, will require the widespread deployment of publicly accessible charging infrastructure. (There are, for instance, only around 50,000 public charging stations currently in the United States.) As Afridi argues, the intrinsic differences between gasoline and electricity means that this is an opportunity to rethink refuelling, and establish unique approaches that can help accelerate adoption. Dynamic wireless charging — where energy is wirelessly delivered to an electric vehicle from charging pads buried beneath the surface of the road — could be the answer.

Such an approach would reduce the amount of energy that needs to be stored onboard an electric vehicle. And ultimately, Afridi suggests, the success of dynamic wireless charging technologies will depend on the cost of deploying a dynamic wireless charging system compared with the cost of having electric vehicles with larger onboard batteries. Either way, sales of electric vehicles are thriving in Europe, China and the United States, and as *The New York Times* also highlighted earlier this month, this should be a breakthrough year for electric cars.

One immediate challenge for the continued growth of electric vehicles is the ongoing chip shortage, which has affected car production worldwide. Tesla has weathered this shortage better than most car makers by switching to chips that are more readily available and then rewriting its software — and recently reported record yearly profits of US$5.5 billion. But the company still expects problems in 2022, with chief executive Elon Musk telling reporters in January, "We expect to be chip-limited this year. It should alleviate next year."

As we highlighted last May (*Nat. Electron.* **4**, 317; 2021), the global chip shortage — combined with the geopolitical factors that can influence semiconductor supply chains — has led to numerous calls to bolster domestic semiconductor manufacturing. And earlier this month, the European Union (EU) unveiled its latest move: the European Chips Act. Targeting more than €43 billion of public and private investment, the plans are intended to help the EU reach its aim — announced last year — of doubling its global market share of semiconductor manufacturing from 10% to 20% by 2030.

In an industry that is a global ecosystem of different business models and suppliers, the EU's plans face many challenges. It also follows plans for a US$52 billion package to subsidize US semiconductor manufacturing from President Joe Biden's administration. For electric vehicle production, the current chip shortage may have been resolved before such measures have had a chance to make a difference. Nevertheless, the shortage — and its response and repercussions — has exposed the inextricable link between the future of semiconductor technology and the future of transport. ❐

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