

Materials for sustainable vehicles, beyond the powertrain.

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The transition to sustainable mobility requires innovations well beyond a change of fuels and types of powertrains. The first generation of electric vehicles has been a mere adaptation of traditional motor vehicles to more or less innovative electrical powertrains. This has been a challenging shift, not only because it required new technologies, but mostly because the change was expected to keep and possibly improve the quality of already highly optimized vehicles in terms of performances, safety and comfort. Now, with battery/electric vehicles well established in the market and fuel-cell vehicles foreseen to be available soon, the sustainability question has been shifted to a next level. With powertrain emissions becoming negligible, attention is shifted to other vehicle's subsystems and to its overall lifecycle. In this perspective, sourcing and recycling of materials become critical. Light and strong metal structures are strategic to EVs' range and safety, and their manufacturing with increasingly recycled alloys is a challenge. The sourcing of the large amount of copper needed in EVs is also a source of concern. Its substitution with aluminum is another technological challenge. Batteries and fuel cells also rely heavily on more or less rare metals, with very uncertain scenarios, given the rapid development of different technologies. Sustainability of polymers in vehicles has already been tackled to a great extent, but the results are below the expectations. The large amounts involved and the high quality standards expected require the development of novel materials up-cycling strategies. Finally, the shift to EVs has made brakes, tires and other parts subject to friction the main emitters of undesired substances from vehicles. Sustainable and low-emission friction materials, tailored to the new powertrains need to be developed. The seminar will discuss the research activities carried on by the Spoke1 of the NODES project in many of the challenges described above.