

Materials for hydrogen handling

Paola RIZZI - University of Turin

European and Italian investments plan to support hydrogen as a carrier in the energy transition. After production and before the use in different applications, hydrogen may need to be purified, transported, compressed and stored. Hydrogen is conventionally stored in high pressure gas cylinders and, as a liquid phase, in opened tanks. These methods present several economic and security problems. So, hydrogen storage in liquid or solid carriers is a suitable method for future applications. Materials to be used as solid-state hydrogen carriers require high mass and volumetric capacity, coupled with a fast kinetics of gas uptake and release. In addition, the reversible hydrogenation reaction should take place close to ambient pressures and temperatures. These properties can be reached when suitable thermodynamic properties are combined with a nanostructure. Some case studies using metal hydrides as hydrogen carrier will be presented. A small scale H₂ refuelling station developed to provide hydrogen for a FC-driven drone will be described. The HyCARE project, funded by FCH JU - H2020 and focussed on the development of an efficient metal hydride-based system for the storage of renewables energies, with a planned quantity of 50 kg of stored hydrogen, will be presented. Finally, the involvement in the projects MOST (Centro Nazionale Mobilità Sostenibile) and NODES (Nord-Ovest Digitale E Sostenibile) will be described.