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Dynamic Capacity and Delivery Performance of Adsorbed Hydrogen Tank Technology ERNEST KNIGHT, ANDREW GILLESPIE, DAVID STALLA, MATTHEW PROSNIEWSKI, ADAM SMITH, PETER PFEIFER, Univ of Missouri - Columbia — In an effort to reduce our carbon footprint and decrease our dependency on a finite fuel supply, mankind has been taking steps towards alternative fuel sources. One of the ideal fuel sources worth striving towards is hydrogen. Combusting hydrogen only produces water vapor and hydrogen is incredibly abundant. The largest hurdle of using hydrogen is the storage of the gas itself. Relying solely on compressing the gas requires large heavy gas cylinders for storage. The amount of gas stored at a given pressure can be greatly increased through the use of adsorbent materials. The nanoporous carbon powder we have used has achieved a gravimetric storage capacity of 31 g H_2/kg C and a volumetric storage capacity of 8.7 g H_2/L at room temperature and 100 bar. This was measured on our 5.3 L tank filled with our adsorbent material. This powder was able to be packed into the tank in such a way that we achieved a packing fraction of 0.63, which reflects the packing of random close packed spheres. We have used monoliths made from these powders to study the storage capabilities as well as the dynamic filling and discharging performance of our tank. With these monoliths, we are able to obtain a packing fraction of 0.96. We have also been able to measure gravimetric storage capacity of 20.4 g H_2/kg C and a volumetric storage capacity of 11 g H_2/L at 195 K and 50 bar on these monoliths. We hope to measure more of this 195 K isotherm as well as thorough isotherm and filling data at 273 K and 296 K.

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