Abstract Submitted
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Adsorbed Methane Film Properties in Nanoporous Carbon Monoliths[1] YUCHOONG SOO, NAGARAJU CHADA, MATTHEW BECKNER, JIMMY ROMANOS, JACOB BURRESS, PETER PFEIFER, Physics Dept. U. of Missouri — Carbon briquetting can increase methane storage capacity by reducing the useless void volume resulting in a better packing density. It is a robust and efficient space-filling form for an adsorbed natural gas vehicle storage tank. To optimize methane storage capacity, we studied three fabrication process parameters: carbon-to-binder ratio, compaction temperature, and pyrolysis temperature. We found that carbon-to-binder ratio and pyrolysis temperature both have large influences on monolith uptakes. We have been able to optimize these parameters for high methane storage. All monolith uptakes (up to 260 bar) were measured by a custom-built, volumetric, reservoir-type instrument. The saturated film density and the film thickness was determined using linear extrapolation on the high pressure excess adsorption isotherms. The saturated film density was also determined using the monolayer Ono-Kondo model. Film densities ranged from ca. 0.32 g/cm^3 - 0.37 g/cm^3.The Ono-Kondo model also determines the binding energy of methane. Binding energies were also determined from isosteric heats calculated from the Clausius-Clapeyron equation and compared with the Ono-Kondo model method. Binding energies from Ono-Kondo were ca. 7.8 kJ/mol - 10 kJ/mol.

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