Hydrogen fuel cell technology presents a new way to store and use energy which may allow us to take advantage of renewable energy production means as and decrease our dependency on foreign oil while reignining in the greenhouse gas emissions responsible for global climate change. However, many technological hurdles stand in the way of creating a viable hydrogen fuel cell economy, not the least of which is finding a safe, efficient, and effective means of storing hydrogen gas. One promising approach utilizes micro porous metal organic framework materials which allow hydrogen to preferentially bind to the pore walls with a relatively low activation energy. While no material has yet been created which would be sufficient for mobile applications, understanding the way that these materials work is vital to improving them. In this talk, I will discuss a number of experiments performed on of these promising materials, including a number of neutron scattering experiments performed at the NIST center for neutron research.