**271g Proton Conductivity of Microporous Zincosilicates**

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Improving the materials used as membranes in fuel cells has been a major focus as a way to improve their efficiency. Yan and coworkers proposed that zeolites added to polymer electrolytes may be effective in reducing methanol crossover in direct methanol fuel cells or in increasing the operating temperature in hydrogen proton exchange membrane fuel cells. Such additives should be thermally stable, hydrophilic, have low methanol permeability, and be good proton conductors. In their previous work, Yan and coworkers reported the proton conductivity of the aluminosilicate zeolite beta and zeolite beta functionalized with organosulfonic acid groups.[1] They found that the organofunctionalized zeolites exhibited excellent proton conductivities, ranging from $1.2x10^{-3}$ to $1.2x10^{-2}$ S/cm, which are only one to two orders of magnitude below those exhibited by Nafion under water-saturated, room temperature conditions.

In our recent work, we have focused on the proton conductivities for a series of zincosilicates. These zincosilicates are microporous, crystalline materials with zeolite-like frameworks. More importantly, they have a high ion density resulting from the need for two counter cations or protons per zinc in the framework as opposed to the one-to-one ratio of counter cation or proton to aluminum in traditional zeolites. Due to these properties, we anticipate that zincosilicate materials, or even a sulfonic acid fuctionalized zincosilicate, may exhibit comparable or higher proton conductivities than their zeolite counterparts.

Here we present proton conductivities, measured using two-electrode impedance spectroscopy, of a series of unfunctionalized zincosilicates. We show conductivities for a series of materials, such as VPI-7, VPI-9, and VPI-10 where the composition is similar (Si/Zn ~4), but the framework structures are different. We also show results from changing the composition, namely the silica to zinc ratio, in several materials with the zeolite *BEA framework. We compare these proton conductivities to previously reported conductivities for aluminosilicate zeolite beta and organic-functionalized zeolite beta to try to elucidate the structural features desired in these materials that yield high proton conductivity.

[1] Holmberg, B.A., et al., Micropor. and Mesopor. Mater., 2005. 80(1-3): p. 347-356.