

**Amphiphilic Organic/Inorganic Nano-composites
Membranes for high Temperature Proton Conducting
Electrolyte**

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Intermediate temperature operation of PEFC has been recently pointed out to overcome most of the technological problems of the current PEFC system such as CO poisoning onto the Pt electrode surfaces, a large activation overpotential and complicated water management. In this report, new class of amphiphilic organic/inorganic nano-hybrid membranes have been synthesized through sol-gel processing of bridged polysilsesquioxanes. The membrane doped with acidic moieties such as 12-phosphotungstic acid (PWA) shows large protonic conductivities at high temperatures up to 160C and was found to be flexible as well as thermally stable due to the temperature tolerant inorganic frameworks in the macromolecules. The fast ionic transport in the hybrid macromolecules have been possibly ascribed to nano- sized phase separation of amphiphilic macromolecules. The proton conductivity of 3×10^{-2} S/cm at 140C with small humidity dependences show promise for an application in the intermediate temperature electrolyte membrane.