

## Novel SPEEK/heteropolyacids loaded MCM-41 composite membranes for fuel cell applications

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### Abstract

Novel composite membranes have been prepared with the help of sulfonated polyether ether ketone (SPEEK) polymer and solid proton conductors developed recently from heteropolyacids loaded MCM-41. The contents of this newly developed solid proton conductors varied from 10 wt.% to 40 wt.% in the composite membranes. The conductivity increased by three to four times in some cases at room temperature and increased to very high values at high temperatures. In all cases, the presence of solid proton conductor led to an increase in conductivity of the membranes without detriment to its flexibility. High water uptake values were also recorded for the membranes. The membranes were characterized using XRD, FTIR and SEM techniques. XRD and FTIR confirmed the presence of material in the polymer matrix while SEM micrographs of composite membranes verified uniform loading of solid proton conductors in the polymer matrix. These low cost membranes have a potential to be considered for use in direct methanol fuel cell for portable devices as well as for medium temperature stationary applications.

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