

Ionconductive properties of mesoporous silica SBA-15-based composite polymer electrolytes

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SBA-15 is a mesoporous silica with uniform, long, connecting tubular channels of variable pore sizes from 5 to 30nm and a large surface area. Mesoporous SBA-15 has been used in a formation of composite polymer electrolytes with a PEO polymer and a lithium salt. In this work, a novel PEO-based composite polymer electrolyte has been developed by using SBA-15 as a filler. The interactions between SBA-15 and PEO matrix were studied by XRD and DSC techniques in detail. The effects of SBA-15 on the electrochemical properties such as ionic conductivity of the PEO-based polymer electrolyte, were studied. As a result, the addition of SBA-15 into the polymer mixture prohibited the growth of PEO crystalline domain due to the mesoporous structures of the SBA-15. Also, the PEO₁₆LiClO₄/SBA-15 composite electrolytes show an increased ion conductivity as a function of SBA-15 content up to 15 wt.%. The ion conductivity characteristics were dependent on crystallinity change with SBA-15 contents.