

**A Study on the PEO-LiN(SO₂CF₂CF₃)₂-SiO₂ Composite Electrolyte
PEO-LiN(SO₂CF₂CF₃)₂-SiO₂ 전해질의 전기화학적 특성에 관한 연구**

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The technological implications of PEO-based electrolytes, such as use in lithium batteries, were realized by Armand et al. And during last 20 years, large research efforts have been focused in this field.

In recent years, the market of consumer electronic products and the stringent demand for environmentally compatible vehicles have motivated the research and development of electrochemical power sources characterized by high energy, high power densities, good cyclability, reliability, and safety. To satisfy consumer's demands, additional improvement of electrochemical and mechanical properties of electrolytes is needed.

One of the most promising answers is composite electrolyte. Inorganic fillers, like glasses, alumina, silica or other ceramics, can improve their transport properties, the resistance to crystallization and the stability of the electrode/electrolyte interface.

PEO($M_v=4 \times 10^5$), Lithium bis(perfluoroethylsulfonyl)imide, SiO₂ with trimethylsilyl(CH₃)₃ and silanol(Si-OH) surface groups(-7nm), and Acetonitrile as a solvent were used for preparing composite solid electrolyte with thickness about 80-100 μm. Emulsion treatment and doctor blade method were adopted to obtain homogeneous and uniform film.

The conductivity was enhanced by about 2-3 orders of magnitude at room temperature. Before measuring the conductivity, all samples were annealed at 90°C over 24h.

The samples were investigated with X-ray diffraction (XRD) and differential scanning calorimetry (DSC) to understand their structural properties as well as by impedance spectroscopy to evaluate the ionic conductivity.

And Voltage window stabilities of films were obtained by LSV.

The addition of the filler allows to increase the conductivity by more than 2 order of magnitude, depending on the SiO₂ concentration. The highest room temperature conductivity is obtained for the sample PEO₁₆-LiN(SO₂CF₂CF₃)₂-12wt% SiO₂ composite electrolyte

As we mentioned above, we have been devote to understand the electrochemical characteristics of PEO-LiN(SO₂CF₂CF₃)₂-SiO₂ composite electrolyte.