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Abstract Formulary

Presentation type: **Oral** ✔ **Poster** ☐

Title: MTMS Silylated Silica Ionogels as a Thin Film Electrolyte for LiBs

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ABSTRACT (Space limited to 2200 characters)

Lithium-ion batteries (LiBs) have become increasingly important energy storage systems in our daily life. However, their practical applications have still severe drawbacks on the safety issues of liquid electrolytes and the poor ionic conductivity of solid-state electrolytes. Thin-film coatings (anode/electrolyte structure) are being considered as an effective solution for building safer and high-performance LiBs. In this study, synthesized as a thin-film electrolyte, silica ionogels was implemented onto the anode material, which was prepared with graphite and PVA-binder. This work is consisting of two parts. In the first one, Graphite, Carbon black, and Polyvinyl alcohol (PVA) were used as active material, electro-conductive additive, and binder, respectively. Polyvinyl alcohol is preferred due to its ease of use and non-toxic structure. The prepared anode mixture was performed onto Cu-foil as a current collector and dried at 70°C for 3 hours. While the first part is about the preparation of anode material that has PVA-binder, the second part is related to preparing thin-coated silica ionogel electrolytes. The silylated functionalized silica-based composite as a solid electrolyte was synthesized with imidazole-based ionic liquid (IL) by following sol-gel coating for lithium-ion battery. During the one-pot sol-gel method, Tetraethylorthosilicate (TEOS) as silica precursor, Methyltrimethoxysilane (MTMS) as silica co-precursor, and electrolyte solution (having IL and Li salt) were used to prepare the sol. Herein, Li TFSI and BMIM TFSI were chosen as li-salt and ionic liquid, respectively. Chosen molarity of Li^+ was 1.5 M in IL. Prepared sol was coated onto the anode material by using film applicator and dried under ambient pressure. Contrary to polymer electrolytes, the thickness of the prepared thin-film electrolytes has been reduced and its structure allowing ion conductivity has been improved. This publication is based upon work from COST Action “Advanced Engineering of aeroGels for Environment and Life Sciences” (AERoGELS, ref. CA18125), supported by COST (European Cooperation in Science and Technology).