



US 20240213531A1

(19) **United States**(12) **Patent Application Publication****AHN et al.**(10) **Pub. No.: US 2024/0213531 A1**(43) **Pub. Date: Jun. 27, 2024**(54) **GEL POLYMER ELECTROLYTE AND LITHIUM SECONDARY BATTERY INCLUDING THE SAME**(30) **Foreign Application Priority Data**

Jul. 29, 2021 (KR) ..... 10-2021-0099776

(71) Applicants: **LG ENERGY SOLUTION, LTD.**,  
Seoul (KR); **IUCF-HYU (INDUSTRY-UNIVERSITY COOPERATION FOUNDATION HANYANG UNIVERSITY)**, Seoul (KR)**Publication Classification**(51) **Int. Cl.****H01M 10/0565** (2006.01)**H01M 10/052** (2006.01)**H01M 10/42** (2006.01)(52) **U.S. Cl.**CPC ..... **H01M 10/0565** (2013.01); **H01M 10/052** (2013.01); **H01M 10/4235** (2013.01); **H01M 2300/0082** (2013.01); **H01M 2300/0085** (2013.01)(72) Inventors: **Kyoung Ho AHN**, Daejeon (KR); **Dong Won KIM**, Seoul (KR); **Won Tae LEE**, Daejeon (KR); **Bo Ra JEONG**, Gwangju (KR); **Da Ae LIM**, Seoul (KR); **Chul Haeng LEE**, Daejeon (KR); **You Kyeong JEONG**, Daejeon (KR)(73) Assignees: **LG ENERGY SOLUTION, LTD.**,  
Seoul (KR); **IUCF-HYU (INDUSTRY-UNIVERSITY COOPERATION FOUNDATION HANYANG UNIVERSITY)**, Seoul (KR)

(57)

**ABSTRACT**

The present disclosure aims at providing a gel polymer electrolyte which has a great effect of inhibiting leakage of an organic solvent by confining the organic solvent in a three-dimensional polymer network and has oxidation stability, flame retardancy, thermal stability, and excellent lithium ion conductivity. In order to achieve the above object, the present disclosure provides a gel polymer electrolyte including a cross-linked polymer having a thiol-ene structure, wherein the thiol-ene structure is formed by a click reaction of a thiol group of a thiol compound containing at least four reactive thiol groups per molecule and an acrylic group of a fluorinated polyether diacrylate.

(21) Appl. No.: **18/287,292**(22) PCT Filed: **Jul. 29, 2022**(86) PCT No.: **PCT/KR2022/011251**

§ 371 (c)(1),

(2) Date: **Oct. 17, 2023**