



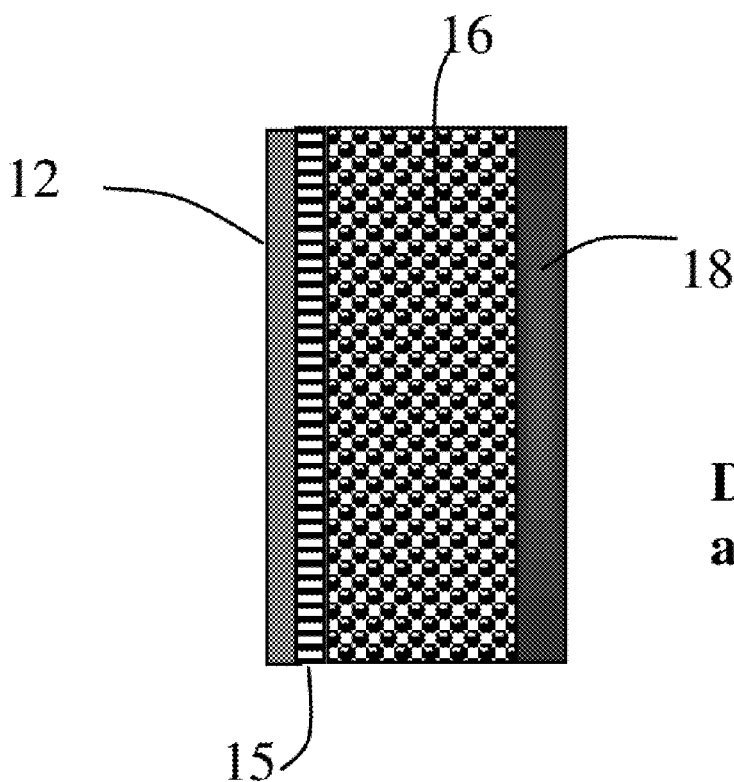
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(19) **United States**(12) **Patent Application Publication**
Zhamu et al.(10) **Pub. No.: US 2023/0231181 A1**(43) **Pub. Date: Jul. 20, 2023**(54) **INORGANIC-POLYMERIC HYBRID
SOLID-STATE ELECTROLYTES, LITHIUM
BATTERIES CONTAINING SAME, AND
PRODUCTION PROCESSES***H01M 4/505* (2006.01)*C08F 124/00* (2006.01)*C08F 112/14* (2006.01)(52) **U.S. CL.**CPC *H01M 10/056* (2013.01); *H01M 10/0525*
(2013.01); *H01M 4/62* (2013.01); *H01M*
4/525 (2013.01); *H01M 4/505* (2013.01);
C08F 124/00 (2013.01); *C08F 112/30*
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(57)

ABSTRACT

A hybrid solid electrolyte particulate (or multiple particulates) for use in a rechargeable lithium battery cell, wherein the particulate comprises one or more than one inorganic solid electrolyte particles encapsulated by a shell of polymer electrolyte wherein the hybrid solid electrolyte particulate has a lithium-ion conductivity from 10^{-6} S/cm to 5×10^{-2} S/cm and both the inorganic solid electrolyte and the polymer electrolyte individually have a lithium-ion conductivity no less than 10^{31} S/cm. Also provided is a lithium-ion or lithium metal cell containing multiple hybrid solid electrolyte particulates in the anode, cathode and/or the separator. Processes for producing hybrid solid electrolyte particulates are also disclosed.

**Discharged state (or
as manufactured)**