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**NAGAMITSU et al.**(10) **Pub. No.: US 2023/0231133 A1**(43) **Pub. Date: Jul. 20, 2023**(54) **ELECTROCHEMICAL DEVICE****H01G 11/66** (2006.01)**H01G 11/58** (2006.01)(71) Applicant: **Panasonic Intellectual Property Management Co., Ltd., Osaka (JP)**(52) **U.S. Cl.**CPC ..... **H01M 4/587** (2013.01); **H01M 10/0525** (2013.01); **H01M 10/0562** (2013.01); **H01M 4/133** (2013.01); **H01G 11/42** (2013.01); **H01G 11/66** (2013.01); **H01G 11/58** (2013.01); **H01M 2300/008** (2013.01); **H01M 2004/021** (2013.01)(21) Appl. No.: **17/998,946**(22) PCT Filed: **May 18, 2021**(86) PCT No.: **PCT/JP2021/018830**

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(57)

**ABSTRACT**

An electrochemical device includes a positive electrode, a negative electrode, and an electrolyte having lithium ion conductivity. The positive electrode includes a positive current collector and a positive electrode mixture layer supported on the positive current collector. The positive electrode mixture layer contains a positive electrode active material reversibly doped with an anion. The negative electrode includes a negative current collector and a negative electrode mixture layer supported on the negative current collector. The negative electrode mixture layer contains a negative electrode active material reversibly doped with lithium ions. The negative electrode active material contains non-graphitizable carbon. A ratio  $M_p/M_n$  of a mass  $M_p$  of the positive electrode active material supported on a unit area of the positive electrode to a mass  $M_n$  of the negative electrode active material supported on a unit area of the negative electrode is in a range from 1.1 to 2.5, inclusive.

