

(19) **United States**
(12) **Patent Application Publication**
Ninomiya

(10) **Pub. No.: US 2024/0213449 A1**
(43) **Pub. Date: Jun. 27, 2024**

(54) **POSITIVE ELECTRODE ACTIVE MATERIAL, LITHIUM ION SECONDARY BATTERY, AND METHOD OF MANUFACTURING POSITIVE ELECTRODE ACTIVE MATERIAL**

(71) Applicant: **TOYOTA JIDOSHA KABUSHIKI KAISHA**, Toyota-shi Aichi-ken (JP)

(72) Inventor: **Takahiko Ninomiya**, Miyoshi-shi Aichi-ken (JP)

(73) Assignee: **TOYOTA JIDOSHA KABUSHIKI KAISHA**, Toyota-shi Aichi-ken (JP)

(21) Appl. No.: **18/544,699**

(22) Filed: **Dec. 19, 2023**

(30) **Foreign Application Priority Data**
Dec. 26, 2022 (JP) 2022-208318

Publication Classification

(51) **Int. Cl.**
H01M 4/36 (2006.01)
H01M 4/04 (2006.01)
H01M 10/0525 (2006.01)
(52) **U.S. Cl.**
CPC *H01M 4/36* (2013.01); *H01M 4/0471* (2013.01); *H01M 10/0525* (2013.01); *H01M 2004/028* (2013.01)

(57) **ABSTRACT**

A positive electrode active material having cycle characteristics is disclosed. The positive electrode active material of the present disclosure has a layered rock salt structure, wherein the layered rock salt structure includes as constituting elements: at least one transition metal element of Ni, Co and Mn; Mg; Li; and O, the Mg content in the positive electrode active material is 0.1 mass % or more and 5.0 mass % or less, and the layered rock salt structure has c-axis length of 13.46 Å or more and 14.20 Å or less.

