

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2024/0213456 A1 Son et al.

Jun. 27, 2024 (43) **Pub. Date:**

(54) COMPOSITE CATHODE ACTIVE MATERIAL, CATHODE AND LITHIUM **BATTERY CONTAINING COMPOSITE** CATHODE ACTIVE MATERIAL AND PREPARATION METHOD THEREOF

(71) Applicant: Samsung SDI Co., Ltd., Yongin-si

Inventors: Inhyuk Son, Yongin-si (KR); Andrei Kapylou, Yongin-si (KR); Sangkook Mah, Yongin-si (KR); Sungnim Jo, Yongin-si (KR); Kyueun Shim, Yongin-si (KR)

(21) Appl. No.: 18/485,579

(22)Filed: Oct. 12, 2023

(30)Foreign Application Priority Data

Dec. 19, 2022 (KR) 10-2022-0178527

Publication Classification

(51) Int. Cl.

H01M 4/36 (2006.01)H01M 4/133 (2006.01)

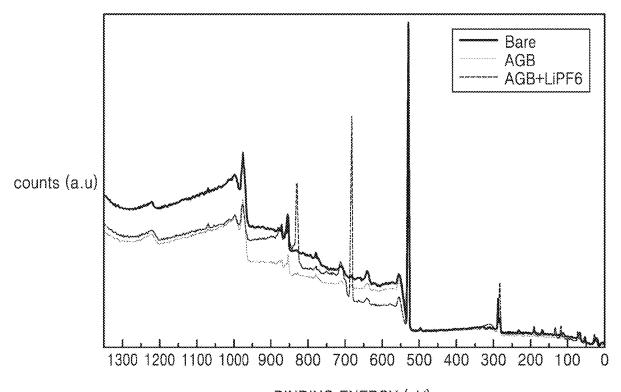
H01M 4/1391	(2006.01)
H01M 4/525	(2006.01)
H01M 4/583	(2006.01)
H01M 10/052	(2006.01)

(52) U.S. Cl.

CPC H01M 4/366 (2013.01); H01M 4/133 (2013.01); H01M 4/1391 (2013.01); H01M 4/525 (2013.01); H01M 4/5835 (2013.01); H01M 10/052 (2013.01); H01M 2004/028 (2013.01)

ABSTRACT (57)

A composite cathode active material, a method of preparing the composite cathode active material, and a cathode and a lithium battery each including the composite cathode active material are provided. The composite cathode active material includes a core including a lithium transition metal oxide and a shell on the surface of the core, wherein the shell comprises a conductive carbon-based composite including a first metal oxide represented by formula M_aO_b (0 $\le a\le 3$, 0<b<4, wherein a is 1, 2, or 3, and b is not an integer) and a carbonaceous material, and a lithium fluoride-based compound, wherein the first metal oxide is within a matrix of the carbonaceous material, and M is one or more metals selected from among Group 2 to Group 13, Group 15, and Group 16 of the Periodic Table.



BINDING ENERGY (eV)