

## (19) United States

### (12) Patent Application Publication (10) Pub. No.: US 2024/0213458 A1 CHUNG et al.

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

### (54) ANODE FOR LITHIUM SECONDARY **BATTERY AND LITHIUM SECONDARY** BATTERY INCLUDING THE SAME

(71) Applicant: SK ON CO., LTD., Seoul (KR)

(72) Inventors: Da Bin CHUNG, Daejeon (KR); Hyo Mi KIM, Daejeon (KR); Hwan Ho

JANG, Daejeon (KR); Moon Sung KIM, Daejeon (KR); Sang Back RYU, Daejeon (KR); Da Hve PARK, Daejeon (KR); Sang In BANG, Daejeon (KR); Seung Hyun YOOK, Daejeon (KR); Jun Hee HAN, Daejeon (KR)

(21) Appl. No.: 18/540,436

Filed: (22)Dec. 14, 2023

(30)Foreign Application Priority Data

Dec. 15, 2022 (KR) ..... 10-2022-0175661

### **Publication Classification**

(51) Int. Cl. H01M 4/36 (2006.01)H01M 4/133 (2006.01)

H01M 4/134	(2006.01)
H01M 4/38	(2006.01)
H01M 4/587	(2006.01)
H01M 4/62	(2006.01)
H01M 10/052	(2006.01)

(52) U.S. Cl.

CPC ...... H01M 4/366 (2013.01); H01M 4/133 (2013.01); H01M 4/134 (2013.01); H01M 4/386 (2013.01); H01M 4/587 (2013.01); H01M 4/622 (2013.01); H01M 10/052 (2013.01); H01M 2004/027 (2013.01)

#### (57)**ABSTRACT**

An anode for a lithium secondary battery includes a material layer configured to serve as a current collector, a first anode mixture layer formed on at least one surface of the material layer, and a second anode mixture layer formed on the first anode mixture layer. The first anode mixture layer includes a first silicon-based active material, the second anode mixture layer includes a second silicon-based active material, and a particle volume fraction ratio  $(R_{PV})$  for each layer according to Equation 1 expressed as  $R_{PV} = V_{D1}/V_{D2}$  is greater than 1. In Equation 1,  $V_{D1}$  is a volume fraction (%) of particles having a particle diameter of 2.5 µm or less in the first silicon-based active material, and  $V_{D2}$  is a volume fraction (%) of particles having a particle diameter of 2.5 µm or less in the second silicon-based active material.

# 100

