US 20240213149A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2024/0213149 A1**

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

(54) **SEMICONDUCTOR DEVICE AND MANUFACTURING METHOD OF SEMICONDUCTOR DEVICE**

(71) Applicant: **SK hynix Inc.**, Icheon-si Gyeonggi-do (KR)

(72) Inventors: **Sang Yong LEE**, Icheon-si Gyeonggi-do (KR); **Sae Jun KWON**, Icheon-si Gyeonggi-do (KR); **Sang Min KIM**, Icheon-si Gyeonggi-do (KR); **Jin Taek PARK**, Icheon-si Gyeonggi-do (KR); **Sang Hyun OH**, Icheon-si Gyeonggi-do (KR)

(73) Assignee: **SK hynix Inc.**, Icheon-si Gyeonggi-do (KR)

(21) Appl. No.: **18/598,129**

(22) Filed: **Mar. 7, 2024**

Related U.S. Application Data

(63) Continuation of application No. 16/917,410, filed on Jun. 30, 2020, now Pat. No. 11,973,022.

(30) **Foreign Application Priority Data**

Jan. 3, 2020 (KR) 10-2020-0001001

Publication Classification

(51) **Int. Cl.**

H01L 23/522	(2006.01)
H01L 23/48	(2006.01)
H10B 41/10	(2006.01)
H10B 41/27	(2006.01)
H10B 41/35	(2006.01)
H10B 43/10	(2006.01)
H10B 43/27	(2006.01)
H10B 43/35	(2006.01)

(52) **U.S. Cl.**

CPC ***H01L 23/5226*** (2013.01); ***H01L 23/481*** (2013.01); ***H10B 41/10*** (2023.02); ***H10B 41/27*** (2023.02); ***H10B 41/35*** (2023.02); ***H10B 43/10*** (2023.02); ***H10B 43/27*** (2023.02); ***H10B 43/35*** (2023.02)

(57) **ABSTRACT**

A semiconductor device includes a line; a source structure on the line; a stack structure on the source structure; a first slit structure penetrating the stack structure; a second slit structure penetrating the stack structure; and a contact plug adjacent to the first slit structure in a first direction. The first slit structure and the second slit structure may be spaced apart from each other by a first distance in a second direction that is perpendicular to the first direction. The contact plug penetrates the source structure, the contact plug being electrically connected to the lower line. The first slit structure and the contact plug may be spaced apart from each other by a second distance in the first direction, and the second distance may be longer than the first distance.