US 20240213098A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2024/0213098 A1**

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

(54) **GATE OXIDE STRUCTURES IN SEMICONDUCTOR DEVICES**

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(21) Appl. No.: **18/600,216**

(22) Filed: **Mar. 8, 2024**

Related U.S. Application Data

(63) Continuation of application No. 17/875,751, filed on Jul. 28, 2022, now Pat. No. 11,961,766, which is a continuation of application No. 17/197,936, filed on Mar. 10, 2021, now Pat. No. 11,430,701.

(60) Provisional application No. 63/083,216, filed on Sep. 25, 2020.

Publication Classification

(51) **Int. Cl.**

H01L 21/8234	(2006.01)
H01L 21/8238	(2006.01)
H01L 29/06	(2006.01)
H01L 29/423	(2006.01)
H01L 29/786	(2006.01)

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

CPC ***H01L 21/823462*** (2013.01); ***H01L 21/823412*** (2013.01); ***H01L 21/823431*** (2013.01); ***H01L 21/823437*** (2013.01); ***H01L 21/823821*** (2013.01); ***H01L 21/823857*** (2013.01); ***H01L 29/0665*** (2013.01); ***H01L 29/42364*** (2013.01); ***H01L 29/42392*** (2013.01); ***H01L 29/78696*** (2013.01)

(57) **ABSTRACT**

A semiconductor device with different gate structure configurations and a method of fabricating the same are disclosed. The method includes forming first and second nanostructured channel regions on first and second fin structures, forming first and second oxide layers with first and second thicknesses, forming a dielectric layer with first and second layer portions on the first and second oxide layers, forming first and second capping layers with first and second oxygen diffusivities on the first and second layer portions, growing the first and second oxide layers to have third and fourth thicknesses, and forming a gate metal fill layer over the dielectric layer. The first and second thicknesses are substantially equal to each other and the first and second oxide layers surround the first and second nanostructured channel regions. The second oxygen diffusivity is higher than the first oxygen diffusivity. The fourth thickness is greater than the third thickness.