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LIN et al.(10) **Pub. No.: US 2023/0231054 A1**(43) **Pub. Date: Jul. 20, 2023**(54) **SEMICONDUCTOR DEVICE STRUCTURE
AND METHOD FOR FORMING THE SAME**(71) Applicant: **Taiwan Semiconductor
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Hsinchu (TW)(21) Appl. No.: **18/190,625**(22) Filed: **Mar. 27, 2023****Related U.S. Application Data**(63) Continuation of application No. 17/729,333, filed on
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(57)

ABSTRACT

A semiconductor device structure is provided. The semiconductor device structure includes a first stacked nanostructure and a second stacked nanostructure formed over a substrate. The semiconductor device structure includes a first gate structure formed over the first stacked nanostructure, and the first gate structure includes a first portion of a gate dielectric layer and a first portion of a filling layer. The semiconductor device structure includes a second gate structure formed over the second stacked nanostructure, and the second gate structure includes a second portion of the gate dielectric layer and a second portion of the filling layer. The semiconductor device structure includes a first isolation layer between the first gate structure and the second gate structure, wherein the first isolation layer has an extending portion which is formed in a recess between the gate dielectric layer and the filling layer.

