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(19) **United States**(12) **Patent Application Publication**
CHEN(10) **Pub. No.: US 2024/0251550 A1**(43) **Pub. Date: Jul. 25, 2024**(54) **THREE-DIMENSIONAL FLASH MEMORY
DEVICE AND METHOD FOR FORMING
THE SAME**(71) Applicant: **Winbond Electronics Corp.**, Taichung
City (TW)(72) Inventor: **Frederick CHEN**, Taichung City (TW)(21) Appl. No.: **18/156,977**(22) Filed: **Jan. 19, 2023****Publication Classification**(51) **Int. Cl.**
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CPC **H10B 41/27** (2023.02)(57) **ABSTRACT**

A three-dimensional (3D) flash memory device is provided. The 3D flash memory device includes a substrate, a T-shaped polysilicon pillar, a select line pillar, a bit line pillar, first and second control gates, first and second floating gates, and first and second high-k dielectric pillars. The select line pillar and the bit line pillar are vertically disposed adjacent to first opposite sidewalls of the horizontally protruding portion on the substrate. The first control gate and the second control gate are positioned adjacent to second opposite sidewalls of the horizontally protruding portion. The first and second floating gates are laterally disposed between the horizontally protruding portion and the first and second control gates. The first and second high-k dielectric pillars are laterally disposed between the first floating gate and the first control gate, as well as between the second floating gate and the second control gate.

