



US 20240244844A1

(19) **United States**(12) **Patent Application Publication**
SONDHI et al.(10) **Pub. No.: US 2024/0244844 A1**(43) **Pub. Date: Jul. 18, 2024**(54) **THREE-DIMENSIONAL MEMORY DEVICE
AND METHOD OF MAKING THEREOF
INCLUDING NON-CONFORMAL
SELECTIVE DEPOSITION OF SPACERS IN
MEMORY OPENINGS****Publication Classification**(51) **Int. Cl.****H10B 43/27** (2006.01)**H10B 41/27** (2006.01)(52) **U.S. Cl.****CPC** **H10B 43/27** (2023.02); **H10B 41/27**
(2023.02)(71) Applicant: **SANDISK TECHNOLOGIES LLC,**
ADDISON, TX (US)(72) Inventors: **Kartik SONDHI,** Milpitas, CA (US);
Senaka KANAKAMEDALA, San
Jose, CA (US)

(57)

ABSTRACT

A method of forming a memory device includes forming an alternating stack of insulating layers and sacrificial material layers over a substrate, forming a memory opening through the alternating stack, irradiating an upper portion of the memory opening with laser radiation, performing a metal area selective deposition process to selectively grow a vertical stack of tubular metal spacer from physically exposed surfaces of middle and lower sacrificial material layers without growing the tubular metal spacers from upper sacrificial material layers, forming a memory opening fill structure in the memory opening, and replacing the sacrificial material layers with electrically conductive layers.

(21) Appl. No.: **18/621,735**(22) Filed: **Mar. 29, 2024****Related U.S. Application Data**(63) Continuation-in-part of application No. 18/534,283,
filed on Dec. 8, 2023, which is a continuation-in-part
of application No. 18/355,888, filed on Jul. 20, 2023.(60) Provisional application No. 63/479,455, filed on Jan.
11, 2023.