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SUNG et al.(10) **Pub. No.: US 2024/0213017 A1**(43) **Pub. Date: Jun. 27, 2024**(54) **METHOD OF MANUFACTURING
INTEGRATED CIRCUIT DEVICE***C23C 16/50* (2006.01)*C23C 16/56* (2006.01)*H01L 21/311* (2006.01)(71) Applicant: **SAMSUNG ELECTRONICS CO.,
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(57)

ABSTRACT

A method of manufacturing an integrated circuit device, the method including forming a doped silicon oxide film on a substrate by supplying, onto the substrate, a silicon precursor, an oxidant, and at least two dopant sources including dopant elements that are different from each other such that the doped silicon oxide film includes at least two dopant elements; forming a vertical hole in the doped silicon oxide film by dry-etching the doped silicon oxide film; and forming a vertical structure in the vertical hole, wherein the silicon precursor includes a monosilane compound, a disilane compound, a siloxane compound, or a combination thereof, and the silicon precursor includes a Si—H functional group, and a C1-C10 oxy group or a C1-C10 organo-amino group.

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