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**FUJIOKA**(10) **Pub. No.: US 2024/0213341 A1**(43) **Pub. Date: Jun. 27, 2024**(54) **SEMICONDUCTOR DEVICE AND  
MANUFACTURING METHOD OF THE SAME**(52) **U.S. CL.**  
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A semiconductor device includes a semiconductor layer formed with trenches, and trench gates correspondingly disposed in the trenches. The trenches extend in a first direction, and are arranged spaced apart from each other in a second direction orthogonal to the first direction. The trenches include an inner trench located between end trenches in the second direction. The inner trench has end side walls opposite in the first direction, and longitudinal side walls between the end side walls. The end side walls have a surface roughness larger than that of intermediate portions of the longitudinal side walls, the intermediate portions being at an intermediate position in the first direction. An insulating film disposed in the inner trench has a larger thickness on at least one of the end side walls than on at least one of intermediate portions of the longitudinal side walls.

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