

**TITLE OF INVENTION: METHOD FOR MANUFACTURING SEMICONDUCTOR
DEVICE, SEMICONDUCTOR DEVICE, AND MEMORY DEVICE**

ABSTRACT

A method for manufacturing a semiconductor device, a semiconductor device, and a memory device are provided. The method includes forming shallow trench isolation structures in a substrate, where each shallow trench isolation structure has a protruding portion protruding from the surface of the substrate and first trenches are defined between the adjacent protruding portions of the shallow trench isolation structures; forming floating gates in first trenches and performing a first etching on a part of the protruding portions of the shallow trench isolation structures, where second trenches are formed between adjacent floating gates; performing a narrowing process on the floating gates; performing a second etching on a remaining part of the protruding portions of the shallow trench isolation structures to widen the second trenches; and forming a control gate, where the control gate is partially filled in the second trenches. Through above, a void generated in the control gate during a filling process is reduced and the yield of the manufactured semiconductor device is improved.

FIG. 1