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**HIRATA et al.**(10) **Pub. No.: US 2024/0213086 A1**(43) **Pub. Date: Jun. 27, 2024**(54) **SEMICONDUCTOR DEVICE AND ETCHING METHOD****Publication Classification**(71) Applicant: **SONY SEMICONDUCTOR SOLUTIONS CORPORATION,**  
KANAGAWA (JP)(72) Inventors: **AKIKO HIRATA, KANAGAWA (JP);**  
**MASANAGA FUKASAWA,**  
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**ABSTRACT**

Provided is an etching method capable of reducing a problem caused by etching during processing of contact holes of a semiconductor device. The etching method includes forming an oxide film by oxidizing, with the use of plasma of a first gas, an upper surface of an insulation film provided on a semiconductor layer containing silicon, attracting a first polymerized film to an upper surface of the oxide film with the use of plasma of a second gas, and removing at least a part of the first polymerized film, the oxide film, and the insulation film with the use of plasma of a third gas.

