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Nano-Mechanical Method for Seeding Circular-Shaped Etch Pits on (100) Silicon Surface

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We investigated the growth mechanism of circular shallow etch pits appearing on (100) silicon wafers during KOH and TMAH etching, and proved that a very small amount of contact pressure applied to the wafer surface is one source of pit formation on the etched wafer surface. We used nano-indentation equipment to control both contacting force and indentation depth applied to (100) silicon wafers, anisotropically etching the wafers with a 34.0 wt.% KOH solution after forming nanometer-sized indentation marks on them. We found that a square-shaped etch pit appeared at the beginning of the etching process, which gradually became rounder with increased etching time and finally became completely circular in shape. The pit diameter was 80 μm when the etching time was 45 min. In this way, we created artificially controlled circular-shaped etch pits on wafers by nano-mechanical treatment of the wafer surface.