High-Density Silicon Lines Patterning with Atomic Layer Etch Pitch Splitting (APS™) Technology

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Figures 1a and b schematically illustrate the structure before and after the APS™ process, respectively, while Figures 1c and d show the corresponding scanning electron microscopy (SEM) images. The incoming silicon line pattern defined by lithography (a, c) is processed using a single-step APS™ process, resulting in the formation of split fins with significantly reduced dimensions (b, d). As shown in the SEM image Figure 1d, the resulting fins exhibit a CDs of 10 nm and a half-pitch of 10 nm. These results demonstrate that APS™ effectively scales down lithographically defined lines and increases pattern density, enabling dense lines fabrication beyond the resolution limit of the original lithography.

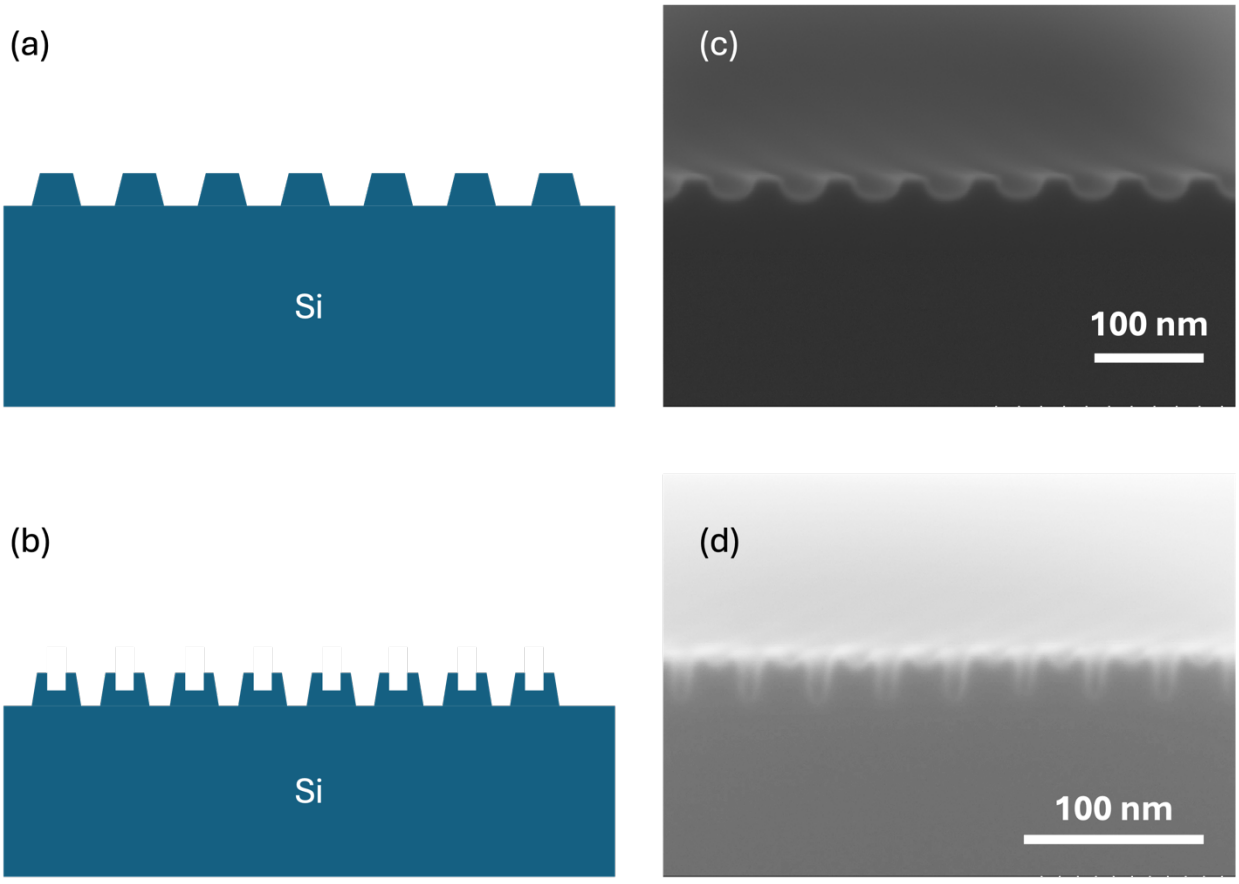

Figure 1. Schematic and corresponding SEM images of dense lines fabrication using APS™. (a) Schematic of incoming silicon lines before APS™. (b) Schemtaic of structure after a single-step APS™ process showing line splitting and increased density. (c) SEM image before APS™. (d) SEM image after APS™, showing fins with a CDs of 10 nm and a half-pitch of 10 nm.