EXHIBIT 12

US006762133B1

(12) **United States Patent**
Rangarajan et al.

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(54) **SYSTEM AND METHOD FOR CONTROL OF HARDMASK ETCH TO PREVENT PATTERN COLLAPSE OF ULTRA-THIN RESISTS**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 302 days.

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(51) **Int. Cl.**^{7} **H01L 4/302**
(52) **U.S. Cl.** **438/745**; 134/1.1; 430/313
(58) **Field of Search** 438/745, 751, 438/756, 757; 134/1.1, 1.2, 1.3; 430/313–315

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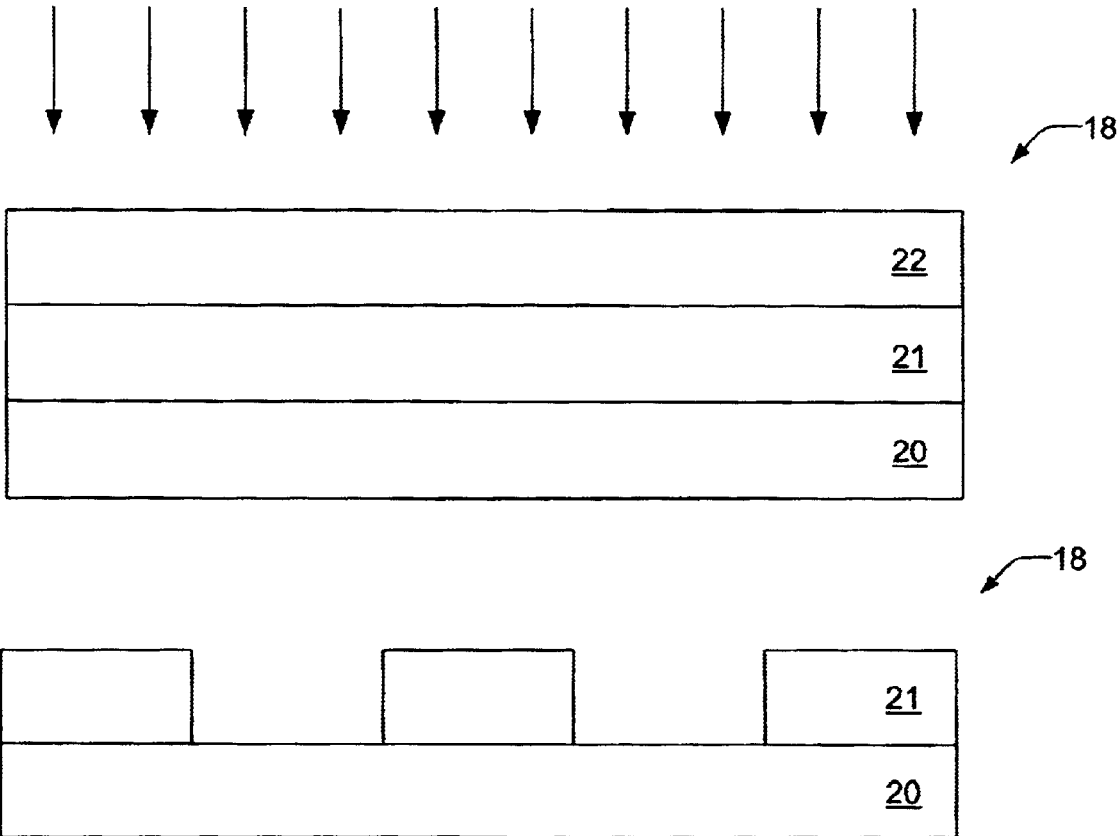|					
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Primary Examiner—Kin-Chan Chen
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(57) **ABSTRACT**

The present invention relates to systems and methods for mitigating pattern collapse in ultra-thin resist processing. In one embodiment, the present invention relates to etching extremely fine patterns into a hardmask immediately after developing an ultra-thin resist, wherein the resist is not dried.
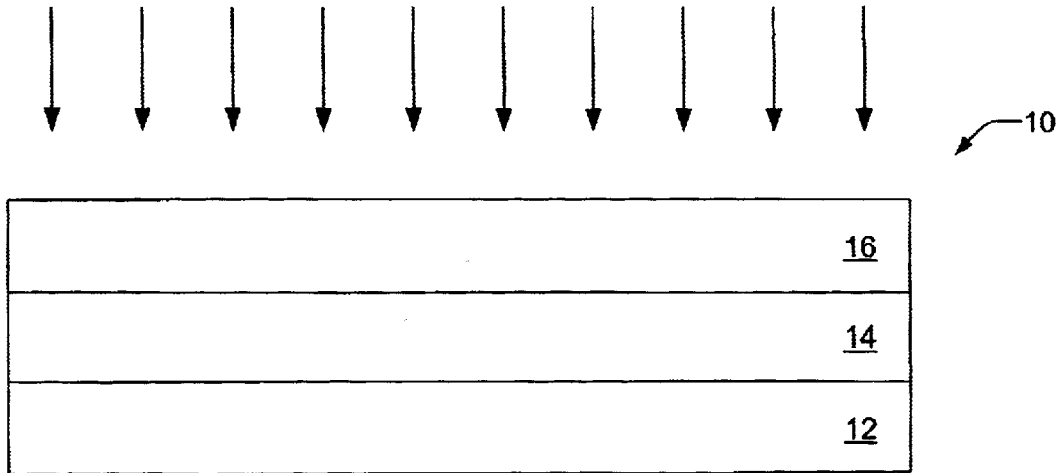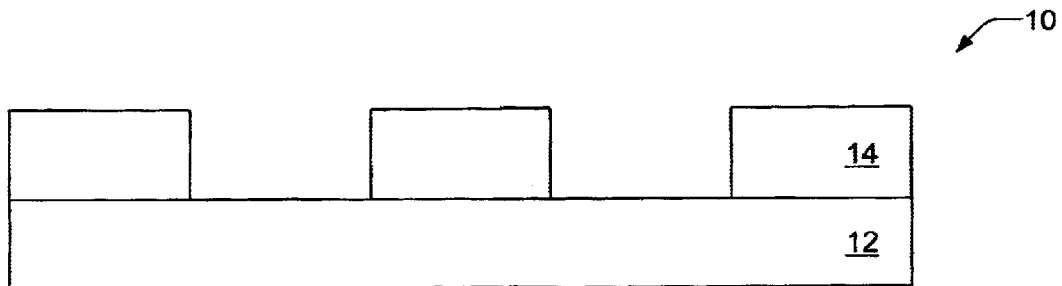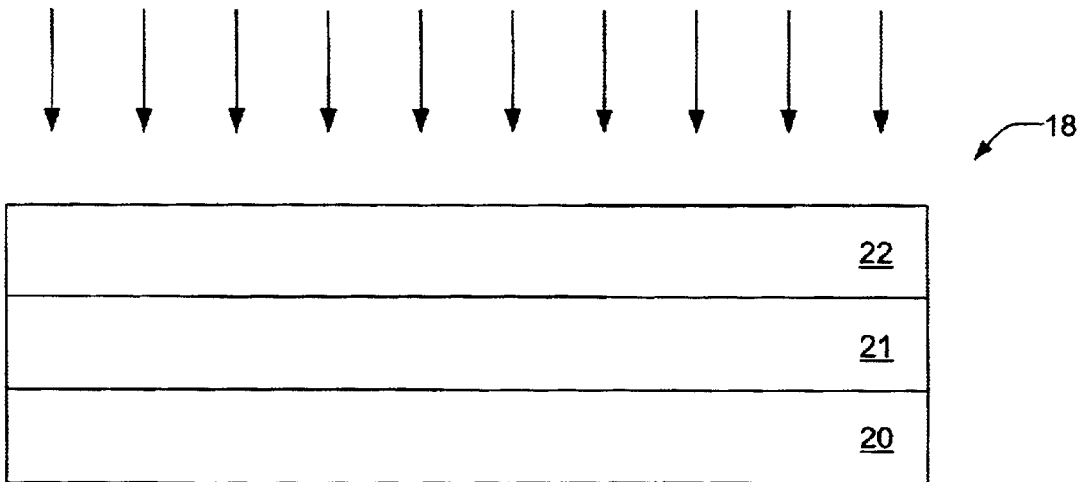
11 Claims, 5 Drawing Sheets

FIG. 1

FIG. 2

FIG. 3

FIG. 4

FIG. 5

FIG. 6

DOCKET ALARM
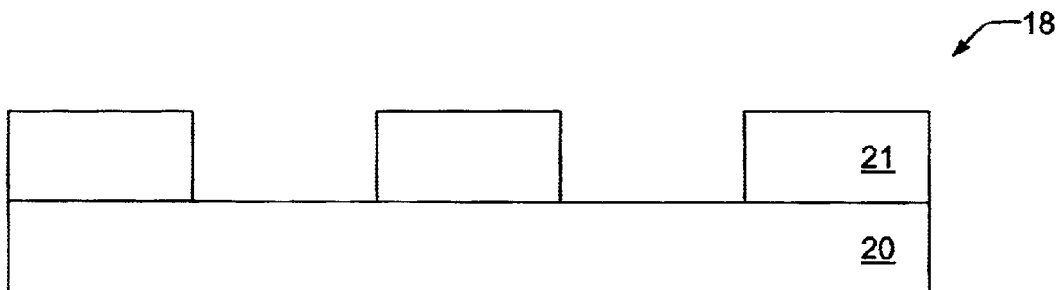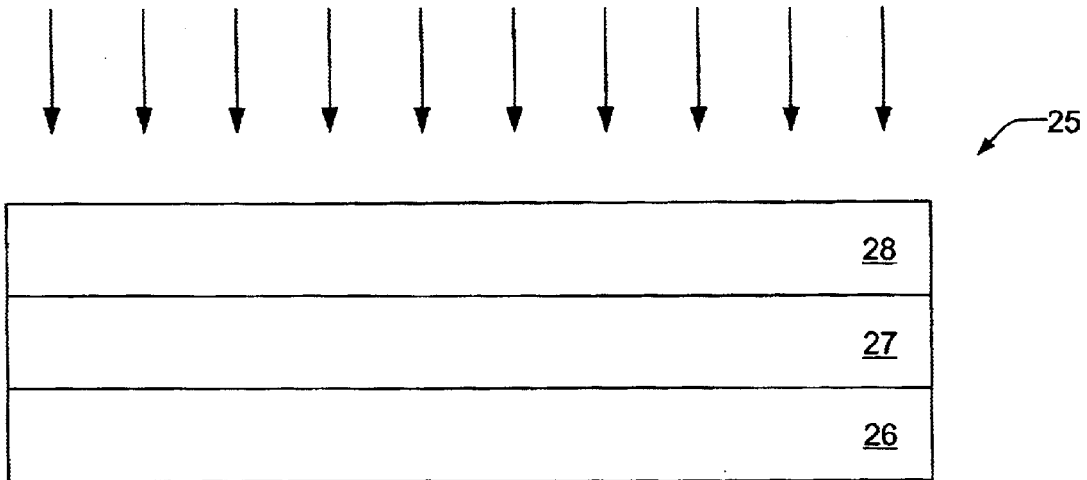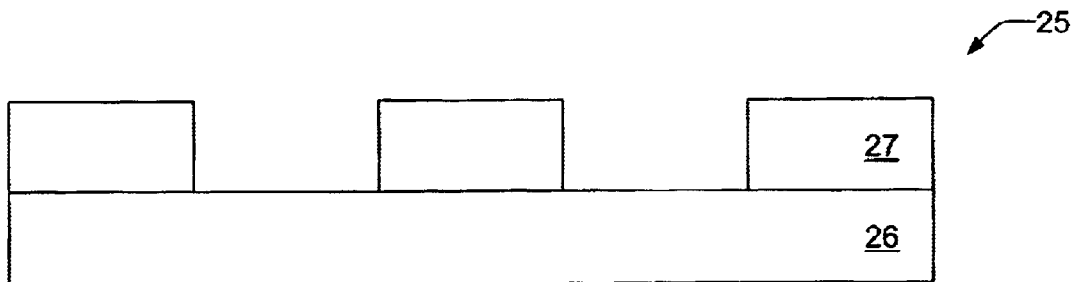
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