EXHIBIT 10

US006162587A

United States Patent [19]

Yang et al.

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[54] **THIN RESIST WITH TRANSITION METAL HARD MASK FOR VIA ETCH APPLICATION**

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[21] Appl. No.: **09/203,450**

[22] Filed: **Dec. 1, 1998**

[51] **Int. Cl.**^{7} **G03C 5/00**

[52] **U.S. Cl.** **430/314**; 430/316; 430/317; 430/318

[58] **Field of Search** 430/313, 316, 430/318, 314, 317; 438/423, 424; 216/47, 39

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[57] **ABSTRACT**

A method of forming a via structure is provided. In the method, a dielectric layer is formed on an anti-reflective coating (ARC) layer covering a first metal layer; and a transition metal layer is formed on the dielectric layer. An ultra-thin photoresist layer is formed on the transition metal layer, and the ultra-thin photoresist layer is patterned with short wavelength radiation to define a pattern for a via. The patterned ultra-thin photoresist layer is used as a mask during a first etch step to transfer the via pattern to the transition metal layer. The first etch step includes an etch chemistry that is selective to the transition metal layer over the ultra-thin photoresist layer and the dielectric layer. The transition metal layer is employed as a hard mask during a second etch step to form a contact hole corresponding to the via pattern by etching portions of the dielectric layer.
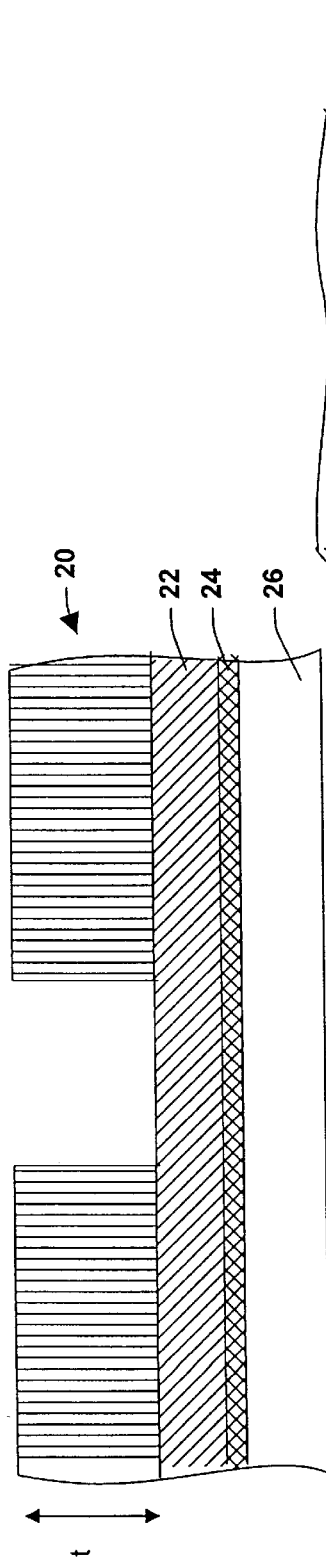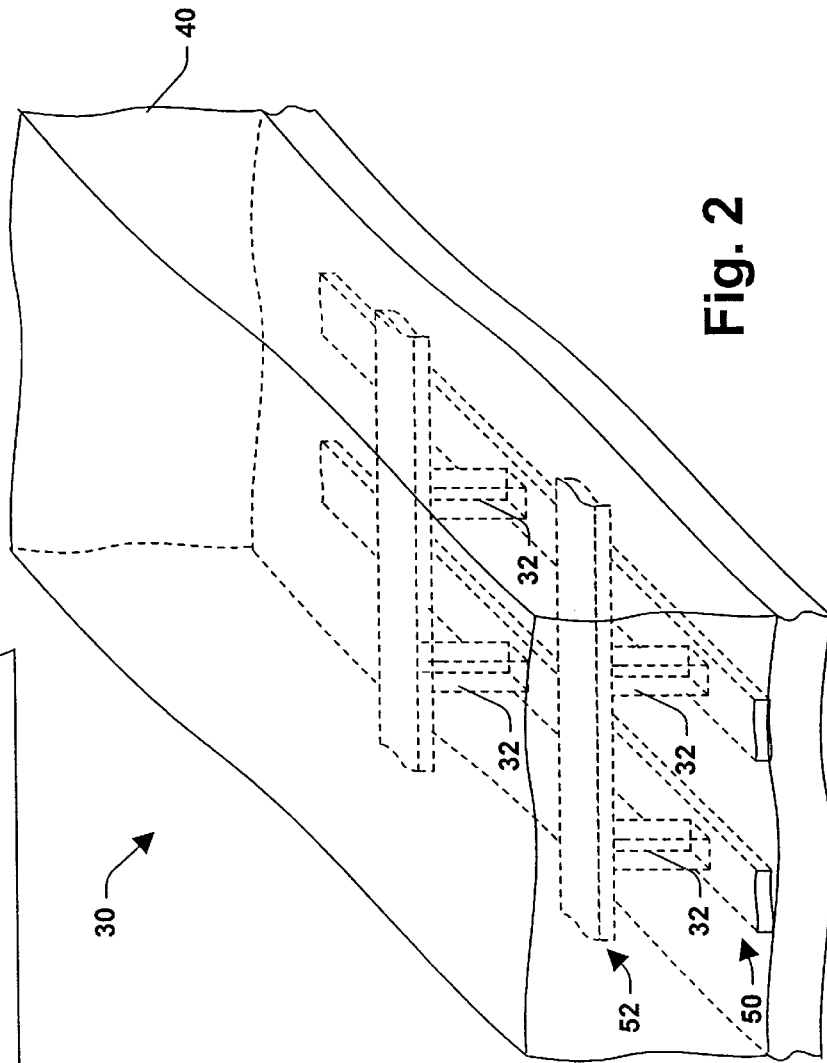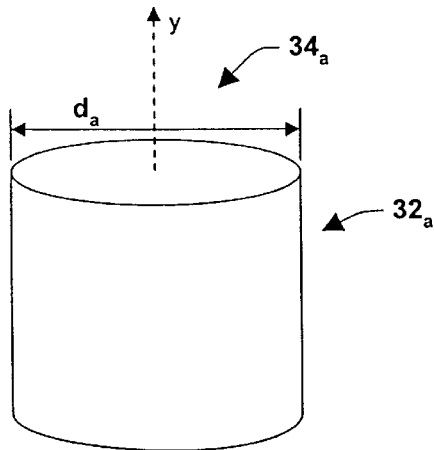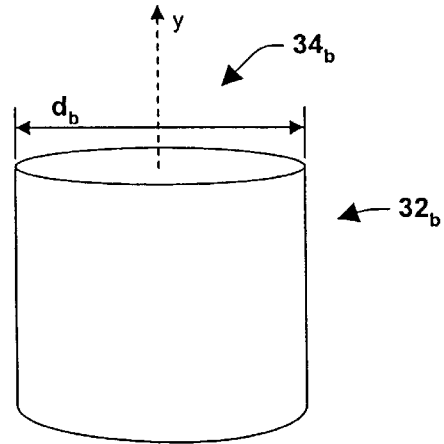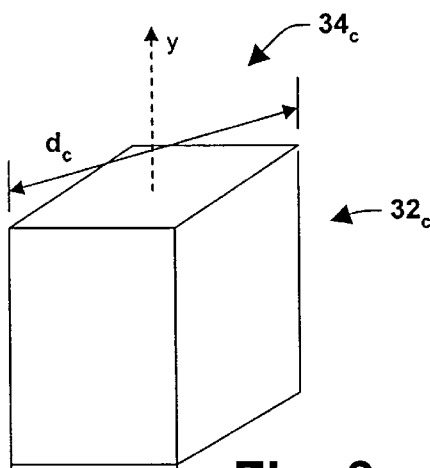
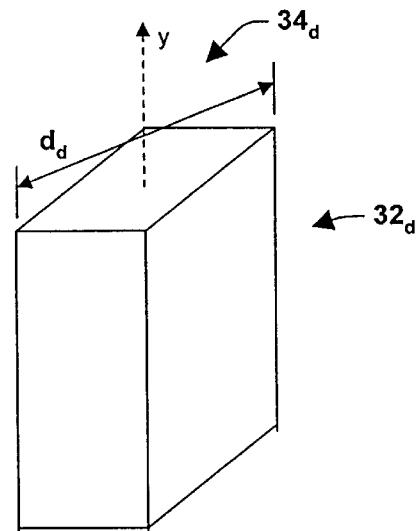**14 Claims, 9 Drawing Sheets**
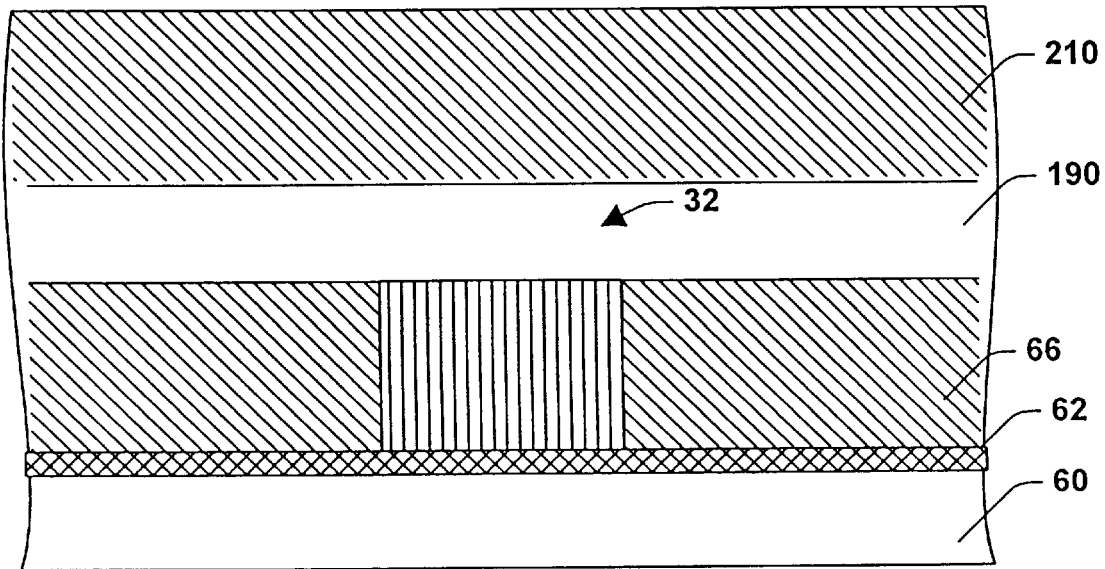
Fig. 1
Prior Art

Fig. 2

Fig. 3a

Fig. 3b
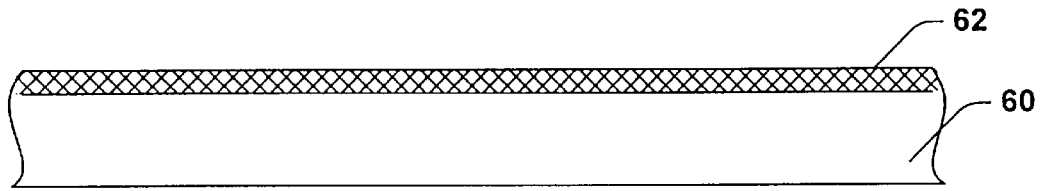

Fig. 3c

Fig. 3d
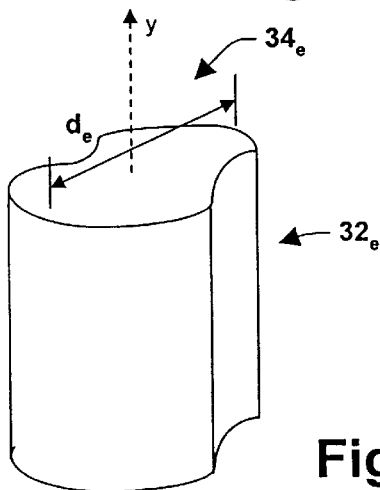
Fig. 3e

Fig. 4

Fig. 5

Fig. 6

DOCKET ALARM
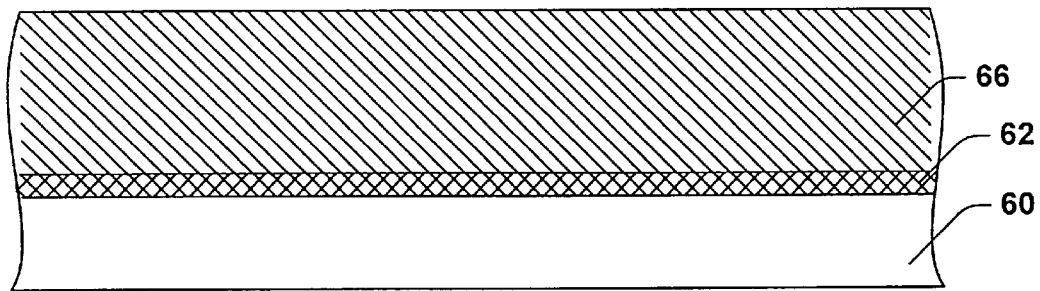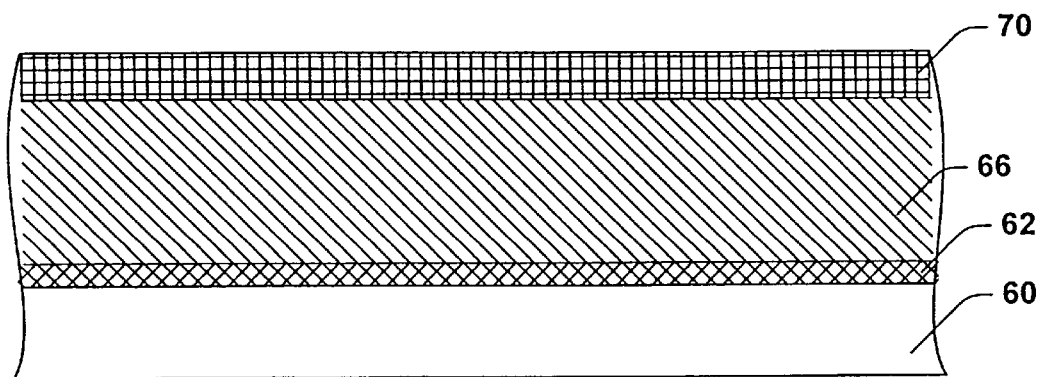
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