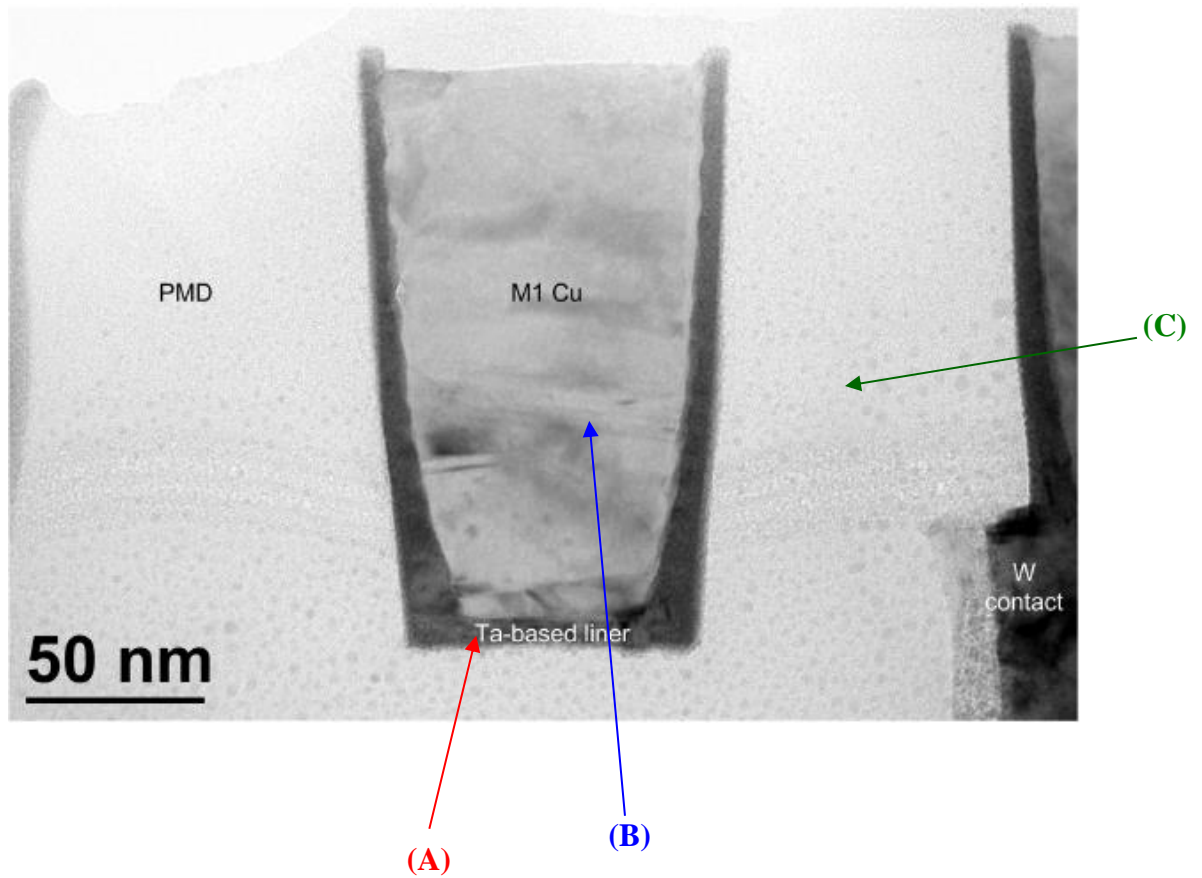

EXHIBIT H

1. **(A) A barrier film** preventing diffusion of copper from **(B) a copper wiring layer** formed on **(C) a semiconductor substrate** comprising
(D) a multi-layered structure of **(D1) first** and **(D2) second films**,
(D1) said first film being composed of **(G) crystalline metal containing nitrogen** therein,
(D2) said second film being composed of **(H) amorphous metal nitride**,
(A) said barrier film being constituted of **(I) common metal atomic species**,
(D1) said first film being formed on **(D2) said second film**,
(D1) said first film in direct contact with **(D2) said second film**,
(D1) said first film (J) containing nitrogen in a smaller content than that of (D2) said second film.

Claim 1

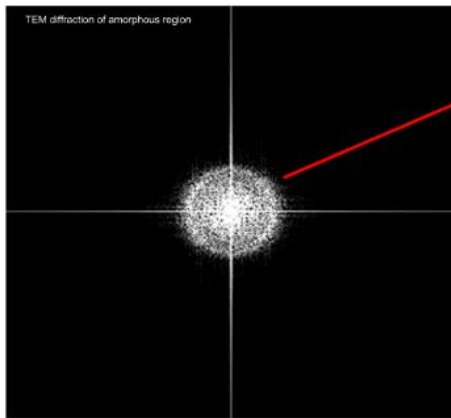
(A) A barrier film preventing diffusion of copper from (B) a copper wiring layer formed on (C) a semiconductor substrate comprising



Claim 1

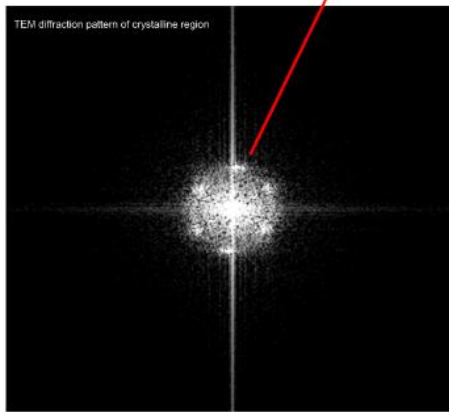
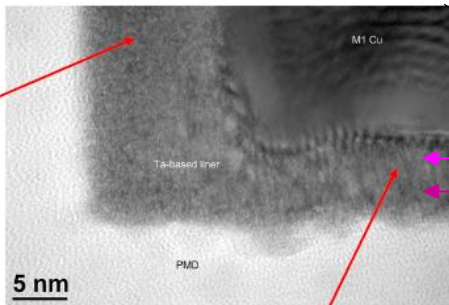
(D) a multi-layered structure of **(D1)** first and **(D2)** second films,
(D1) said first film being composed of **(G)** crystalline metal containing nitrogen therein,
(D2) said second film being composed of **(H)** amorphous metal nitride,

Metal 1 Ta-Based – FFT of Amorphous and Crystalline Regions



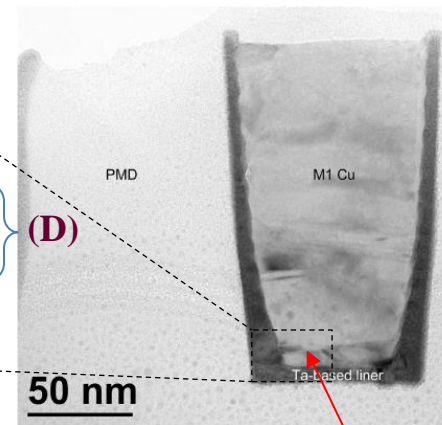
Amorphous Region

(H) : Amorphous Region



Crystalline Region

(G) : Crystalline Region

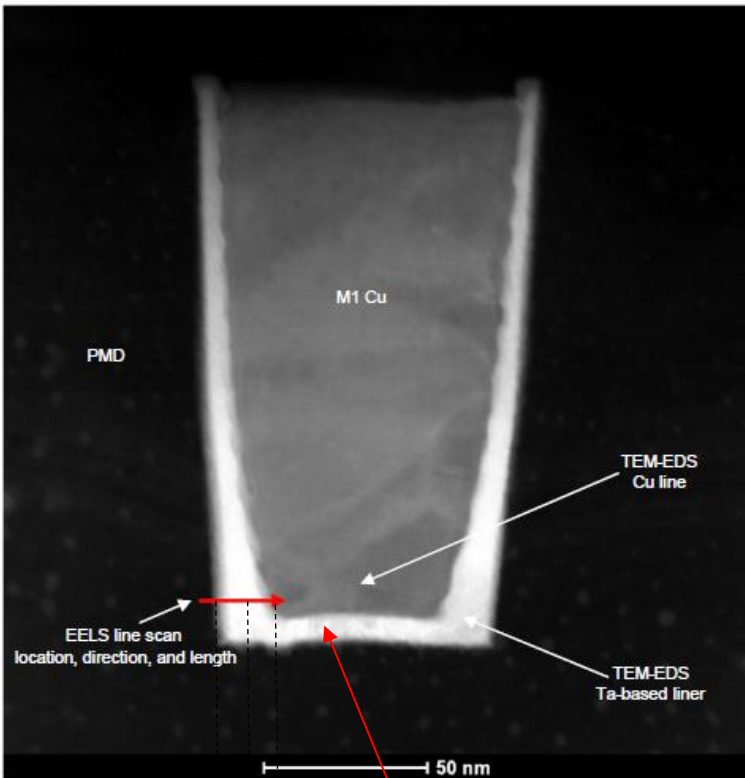


(A) a barrier film

Claim 1

(D) a multi-layered structure of (D1) first and (D2) second films,
 (D1) said first film being composed of (G) crystalline metal containing nitrogen therein,
 (D2) said second film being composed of (H) amorphous metal nitride,

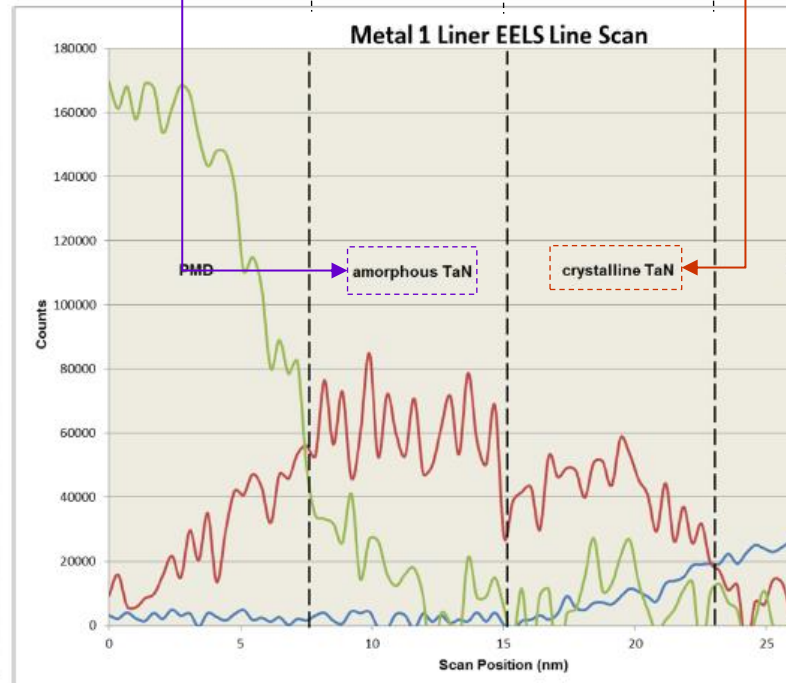
Metal 1 Cu Line – Analysis Locations



(D2) (D1)
 (A) a barrier film

(H) : amorphous TaN

(G) : crystalline TaN



Metal 1 Ta-Based Liner – EELS Line Scan

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