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(21) International Application Number: PCT/US98/10078 (22) International Filing Date: 15 May 1998 (15.05.98) (30) Priority Data: 08/857,658 16 May 1997 (16.05.97) US (63) Related by Continuation (CON) or Continuation-in-Part (CIP) to Earlier Application US 08/857,658 (CON) Filed on 16 May 1997 (16.05.97) (71) Applicant (for all designated States except US): APPLIED MATERIALS, INC. [US/US]; P.O. Box 450A, Santa Clara, CA 95052 (US). (72) Inventors; and (75) Inventors/Applicants (for US only): RAJAGOPALAN, Ravi [IN/US]; 1124 Ayala Drive #2, Sunnyvale, CA 94086 (US). GHANAYEM, Steve [US/US]; 1576 Ontario Drive #10, Sunnyvale, CA 94087 (US). YAMAZAKI, Manabu [JP/JP]; 1-406, Ha Yachimata, Yachimata-shi, Chiba (JP). OHT-SUKA, Keiichi [JP/JP]; 1-407 Mezonrahaina, 2-9-11, Igo-dai Narita-shi, Chiba (JP). MAEDA, Yuji [JP/JP]; 4-4-16, Agikidai Sakaemachi, Inbanuma-gun, Chiba (JP).	(74) Agents: SHAFFER, William, L. et al.; Townsend and Townsend and Crew LLP, 8th floor, Two Embarcadero Center, San Francisco, CA 94111-3834 (US). (81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>	

(54) Title: **LOW RESISTIVITY W USING B₂H₆**

(57) Abstract

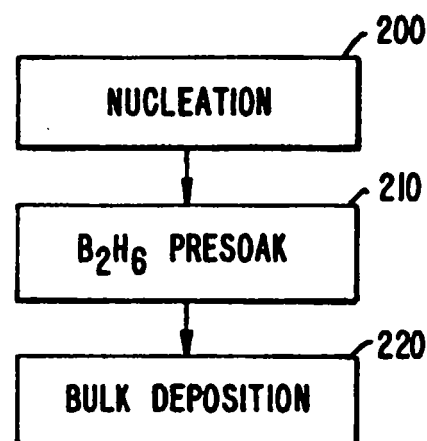
A multiple step chemical vapor deposition process for depositing a tungsten layer on a substrate (16). A first step of the deposition process includes a nucleation step in which WF₆ and SiH₄ are introduced into a deposition chamber (step 200). Next, the flow of WF₆ and SiH₄ are stopped and diborane is introduced into the chamber (12) for between 5-25 seconds (step 210). Finally, during a bulk deposition step, the WF₆ is reintroduced into the chamber along with H₂ and B₂H₆ flows to deposit a tungsten layer on the substrate (step 220). In a preferred embodiment, the bulk deposition step also introduces nitrogen into the process gas.



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