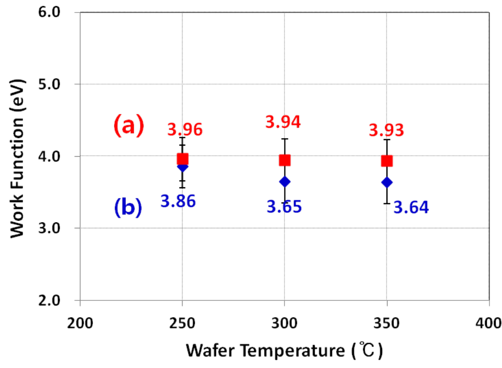

Fig. 1. Work function of ZrB_x films in XPS as a function of wafer temperature: (a) bulk and (b) surface.

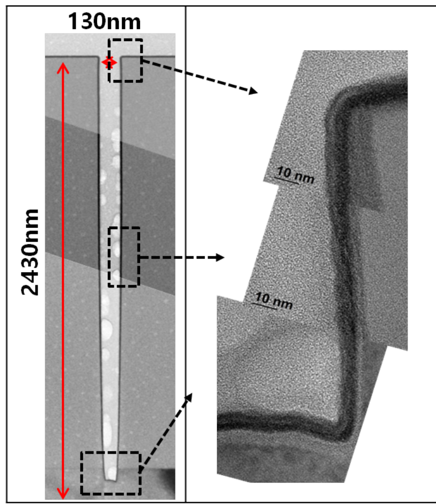

Fig. 2. Cross-sectional TEM image of ZrB_x film grown at 250 °C on SiO_2 contact line structure with aspect ratio of approximately 19.

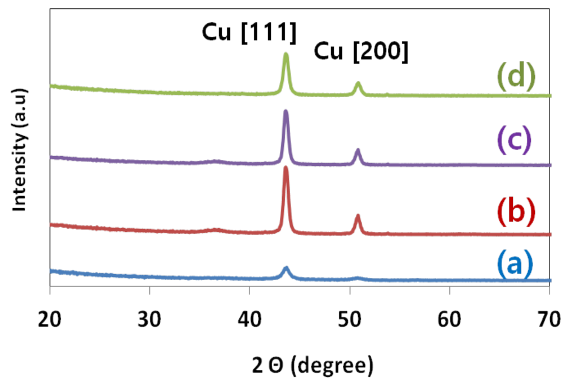

Fig. 3. XRD patterns of the $Cu/ZrB_x/Si$-substrate multilayer films (a) as-deposited at 250 °C and after annealing at (b) 400, (c) 500 and (d) 600 °C.

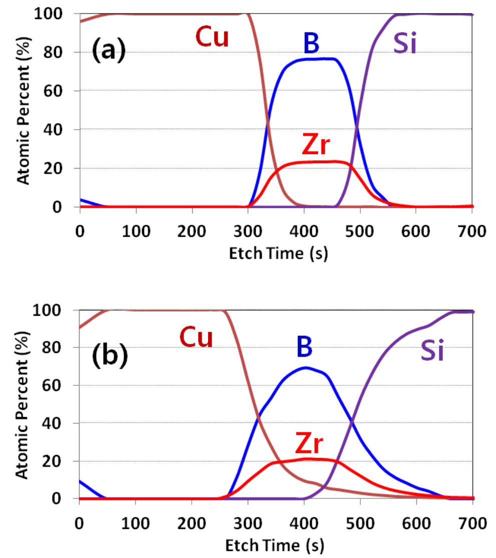

Fig. 4. XPS depth profiles of $Cu/ZrB_x/Si$ -substrate multilayer films (a) as-deposited at 250 °C and after annealing at (b) 600 °C.

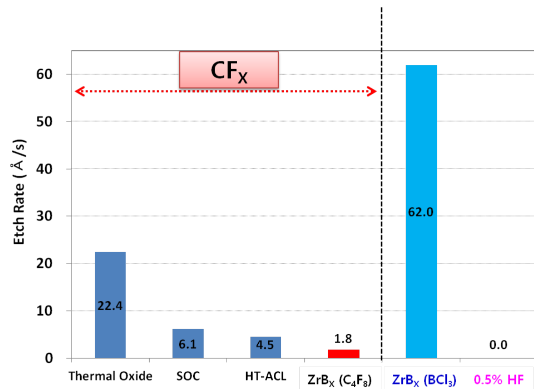

Fig. 5. Dry and wet etch rate of ZrB_x films as-deposited at 250 °C.

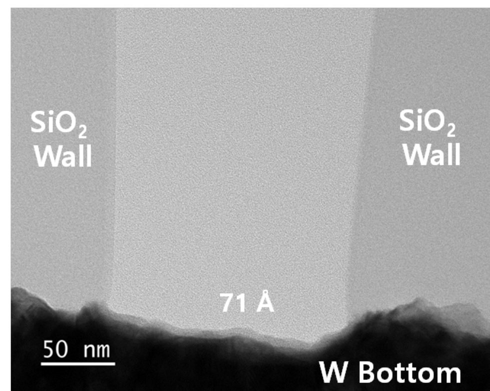

Fig. 6. TEM image of ZrB_x film grown at 250 °C on W bottom and SiO_2 wall structure.