FIG. 1

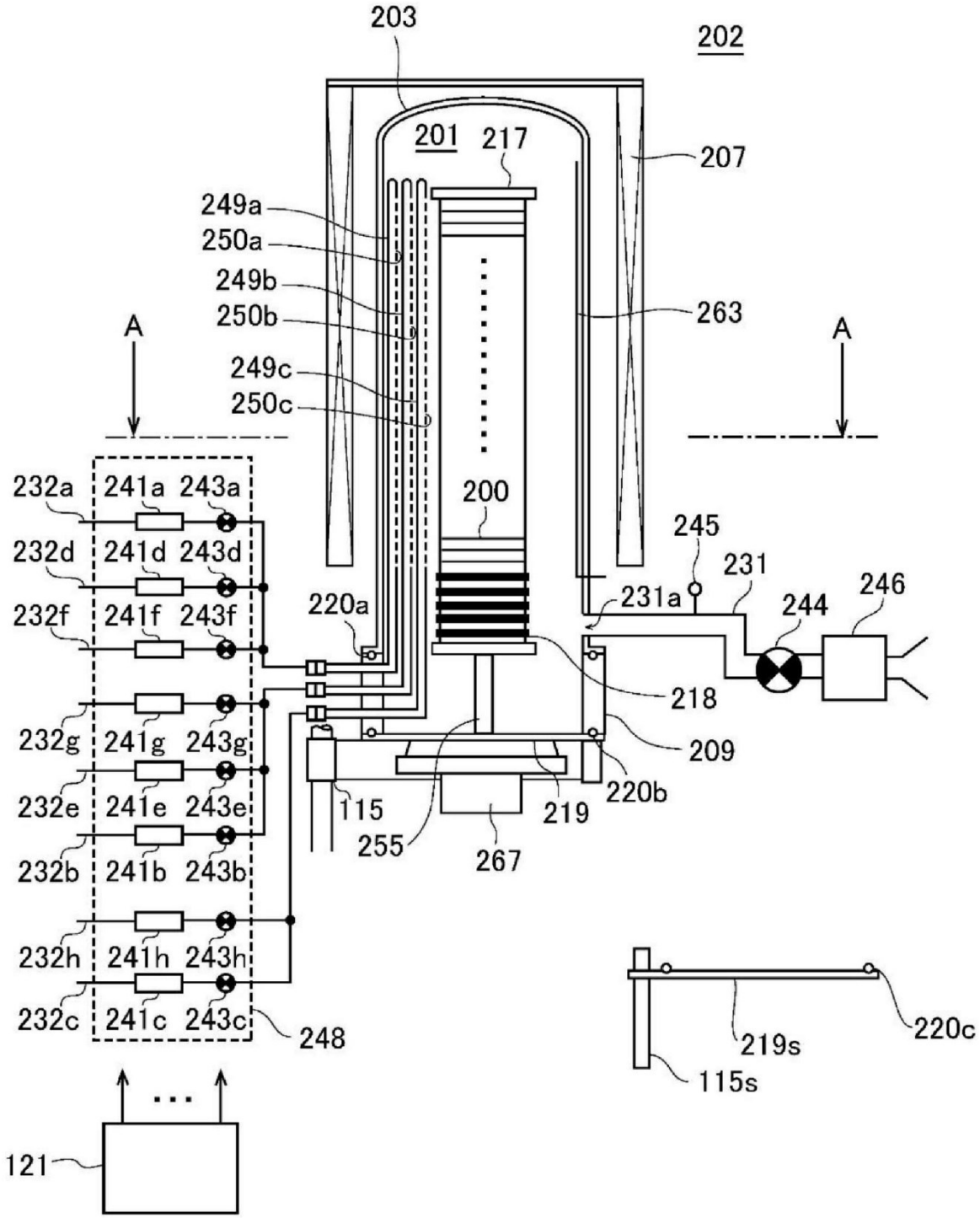

203
202
201
217
207
249a
250a
249b
250b
263
A
A
249c
250c
232a
241a
243a
200
245
231
246
232d
241d
243d
231a
244
220a
232f
241f
243f
218
232g
241g
243g
209
232e
241e
243e
220b
115
219
232b
241b
243b
255
267
232h
241h
243h
232c
241c
243c
248
219s
220c
115s
121

FIG. 2

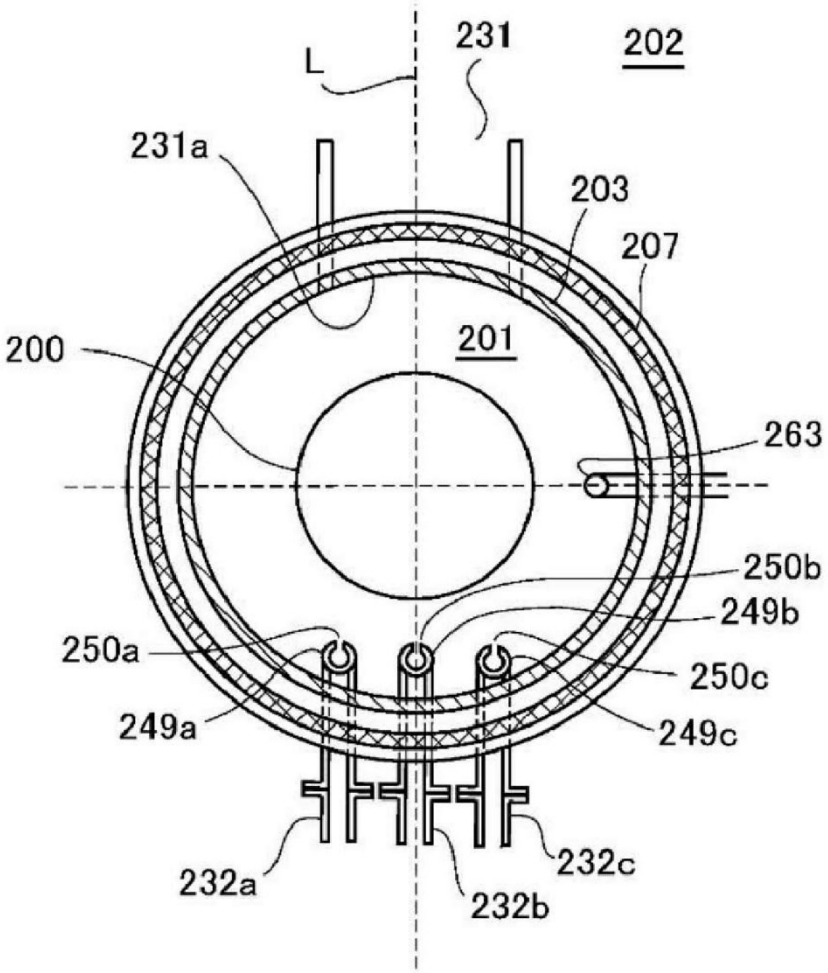

231
202
L
231a
203
207
200
201
263
250b
249b
250a
250c
249a
249c
232a
232b
232c

FIG. 3

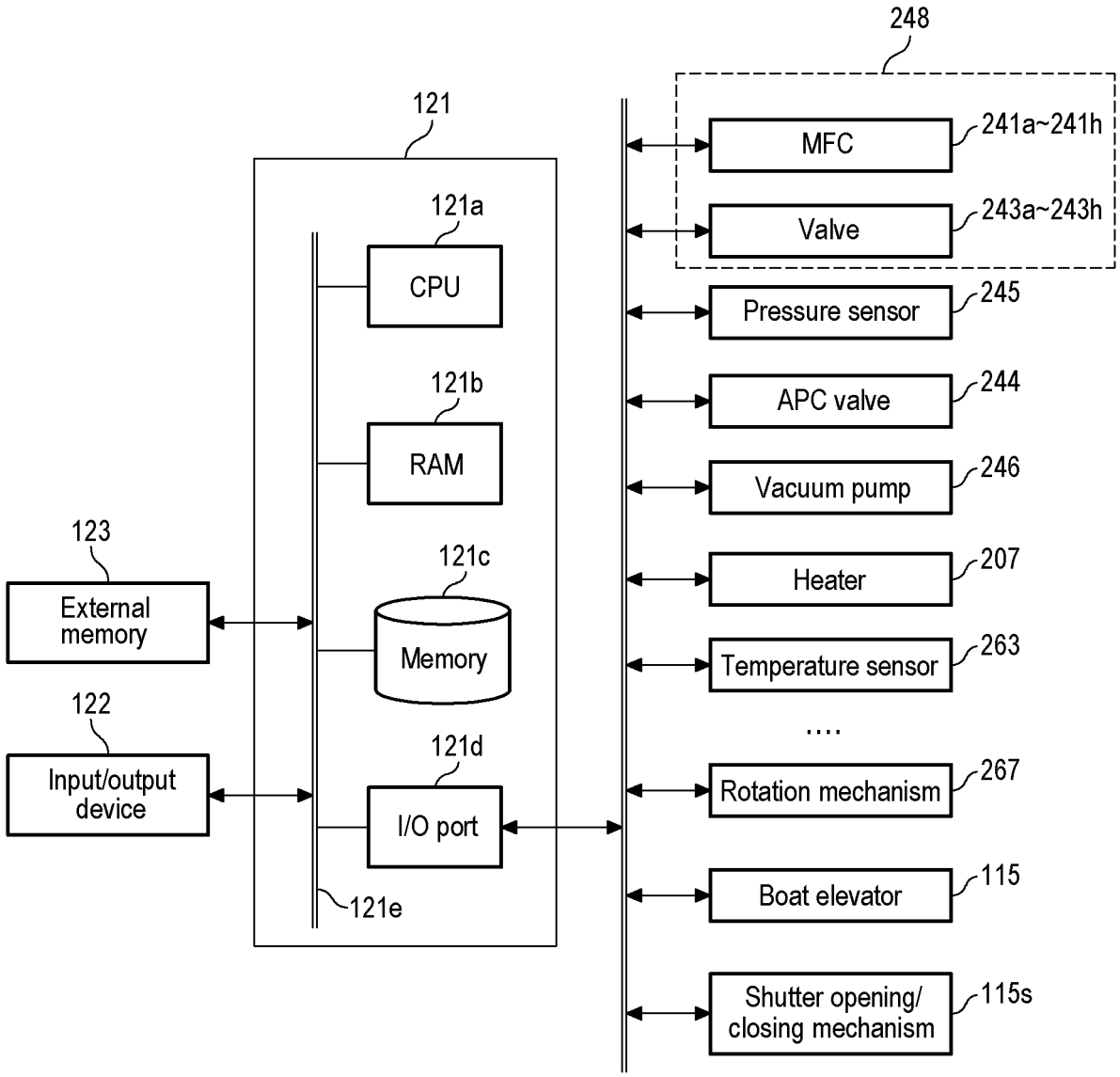

248
121
MFC
241a~241h
Valve
243a~243h
121a
CPU
Pressure sensor
245
121b
RAM
APC valve
244
Vacuum pump
246
123
External memory
121c
Memory
Heater
207
Temperature sensor
263
....
122
Input/output device
121d
I/O port
Rotation mechanism
267
Boat elevator
115
121e
Shutter opening/ closing mechanism
115s

FIG. 4A

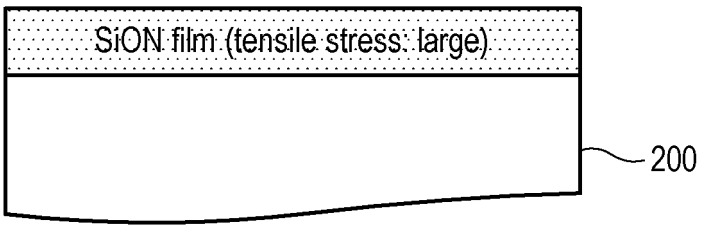


FIG. 4B

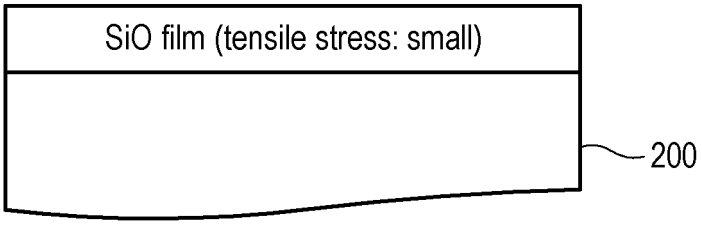


FIG. 4C

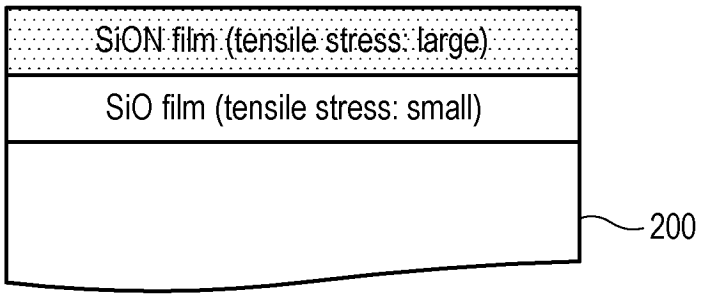


FIG. 4D

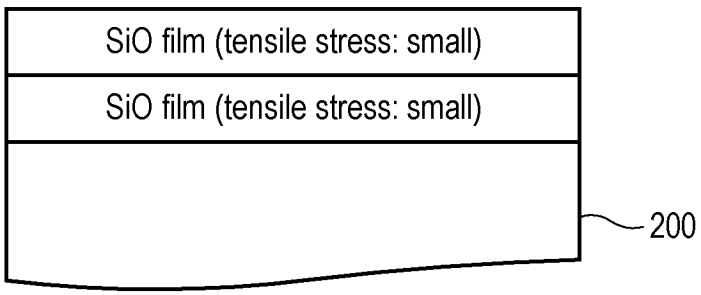


FIG. 5A

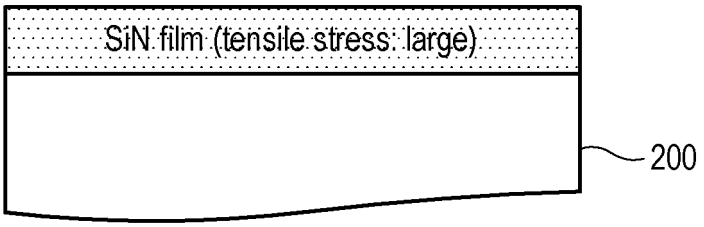


FIG. 5B

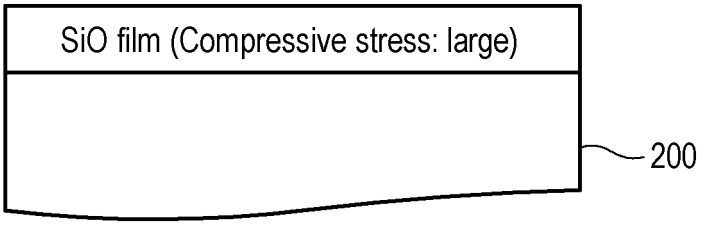


FIG. 5C

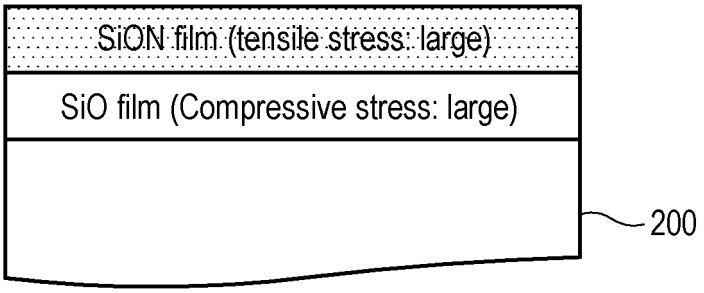


FIG. 5D

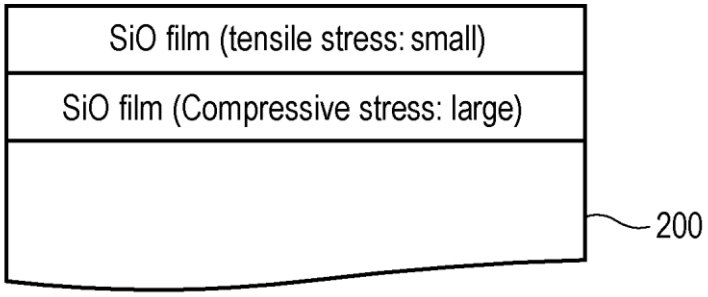


FIG. 6A

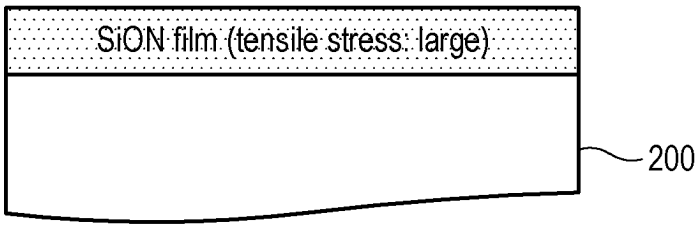


FIG. 6B

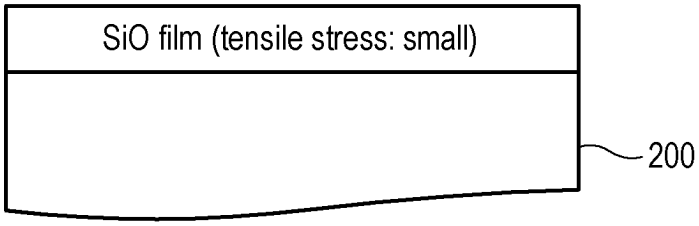


FIG. 6C

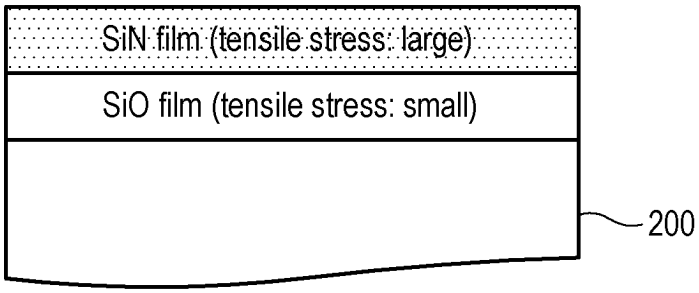


FIG. 6D

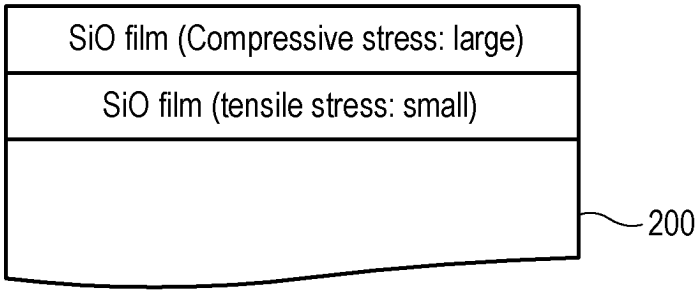


FIG. 7A

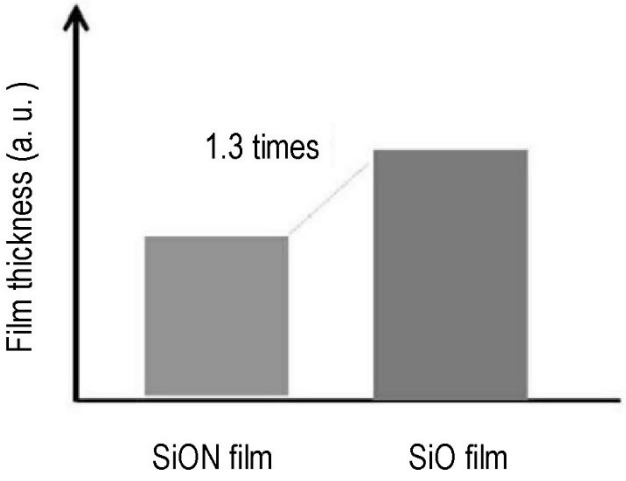

Film thickness (a. u.)
1.3 times
SiON film
SiO film

FIG. 7B

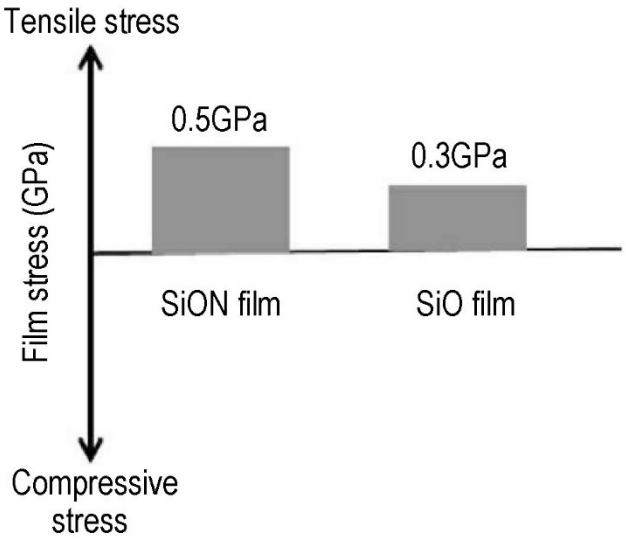

Tensile stress
Film stress (GPa)
0.5GPa
0.3GPa
SiON film
SiO film
Compressive stress

FIG. 8A

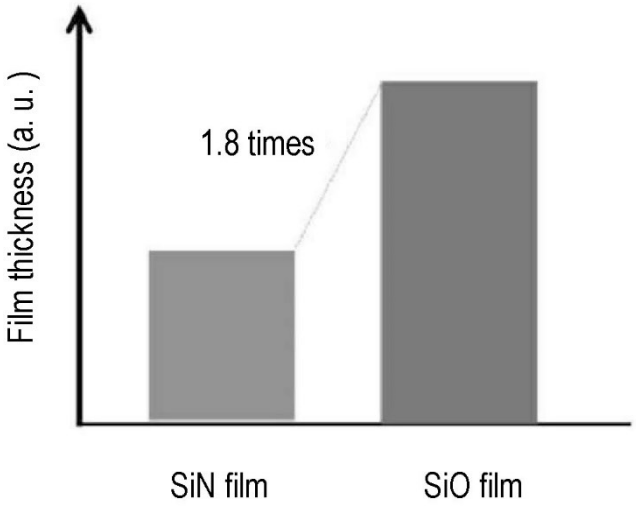
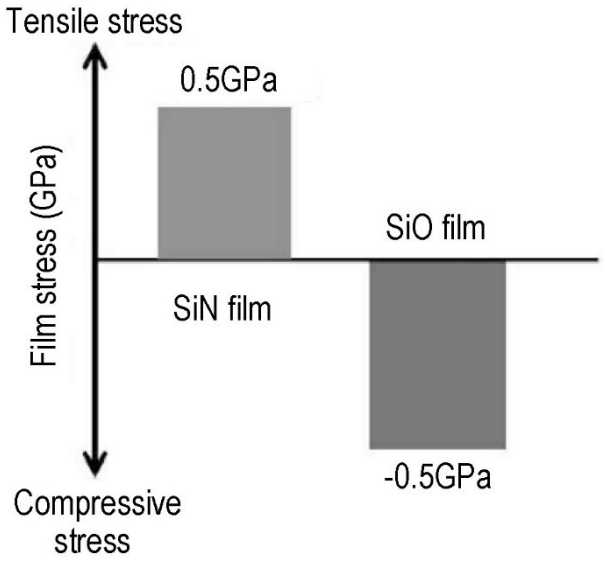

Film thickness (a. u.)
1.8 times
SiN film
SiO film

FIG. 8B


Tensile stress
0.5GPa
Film stress (GPa)
SiO film
SiN film
-0.5GPa
Compressive stress