Fig. 1

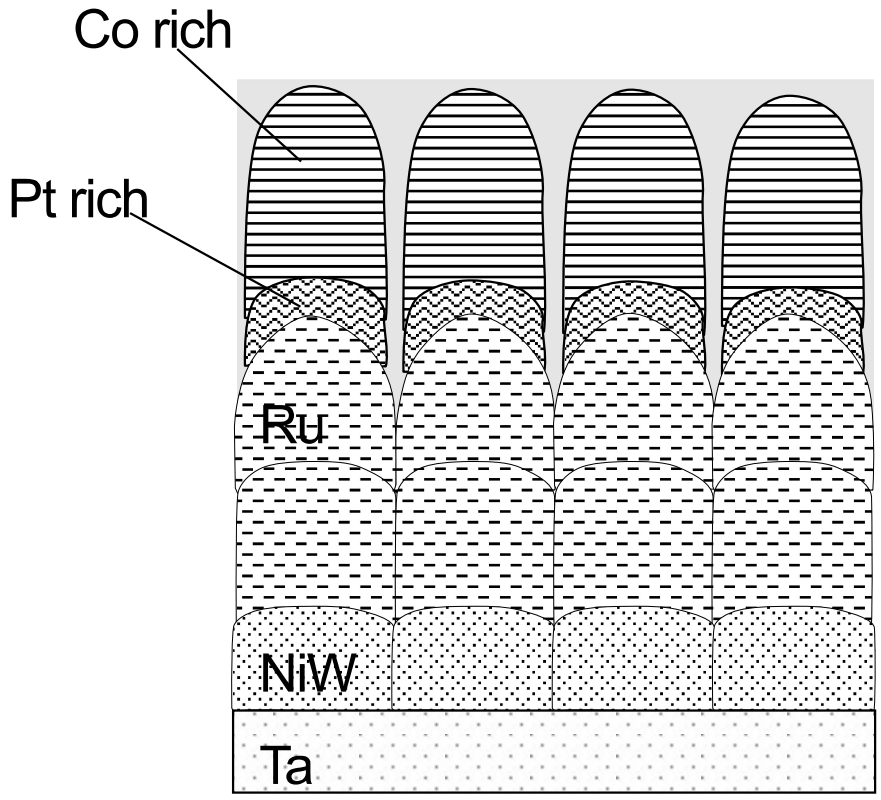


Fig. 2

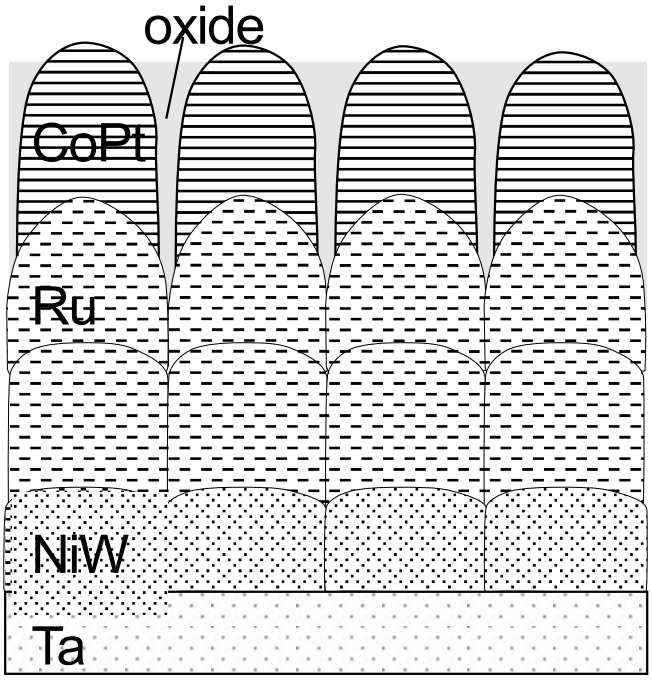


Fig. 3-A

layer structure	thickness
C	7 nm
Co-rich Magnetic layer	0.5 - 16 nm
Pt-rich Buffer layer	0 - 2.5 nm
Ru Under layer 2	10 nm
Ru Under layer 1	10 nm
Ni90W10	6 nm
Ta	5 nm
Glass	

Fig. 3-B

layer structure	thickness
C	7 nm
Pt-rich Buffer layer	0 - 2.6 nm
Co-rich Magnetic layer	0.5 - 16 nm
Ru Under layer 2	10 nm
Ru Under layer 1	10 nm
Ni90W10	6 nm
Ta	5 nm
Glass	

Fig. 3-C

layer structure	thickness
C	7 nm
Pt-rich Buffer layer 4	0 - 0.8 nm
Co-rich Magnetic layer 4	4 nm
Pt-rich Buffer layer 3	0 - 0.8 nm
Co-rich Magnetic layer 3	4 nm
Pt-rich Buffer layer 2	0 - 0.8 nm
Co-rich Magnetic layer 2	4 nm
Pt-rich Buffer layer 1	0 - 0.8 nm
Co-rich Magnetic layer 1	4 nm
Ru Under layer 2	10 nm
Ru Under layer 1	10 nm
Ni90W10	6 nm
Ta	5 nm
Glass	

Fig. 4

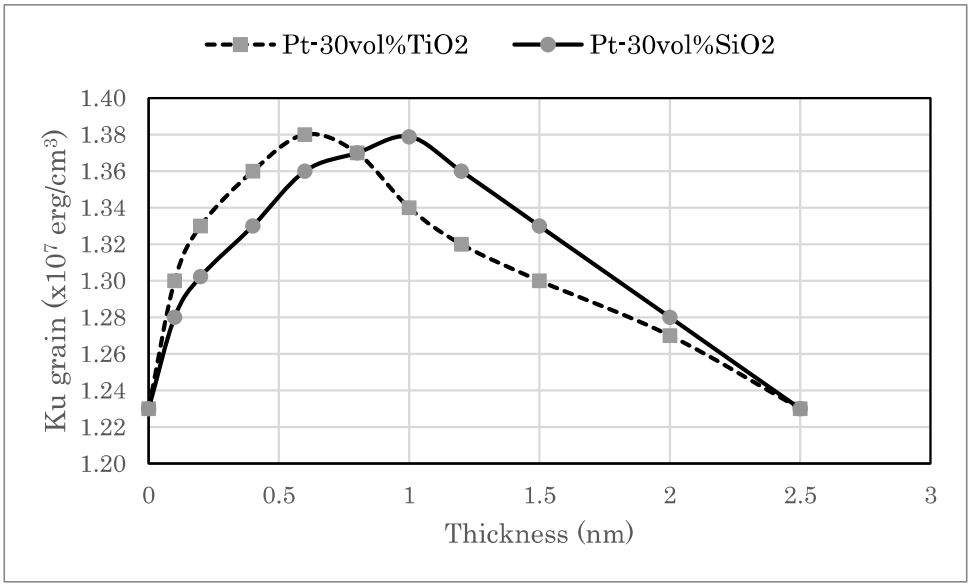

Pt-30vol%TiO2
Pt-30vol%SiO2
Ku grain (x10⁷ erg/cm³)
1.40
1.38
1.36
1.34
1.32
1.30
1.28
1.26
1.24
1.22
1.20
0
0.5
1
1.5
2
2.5
3
Thickness (nm)

Fig. 5

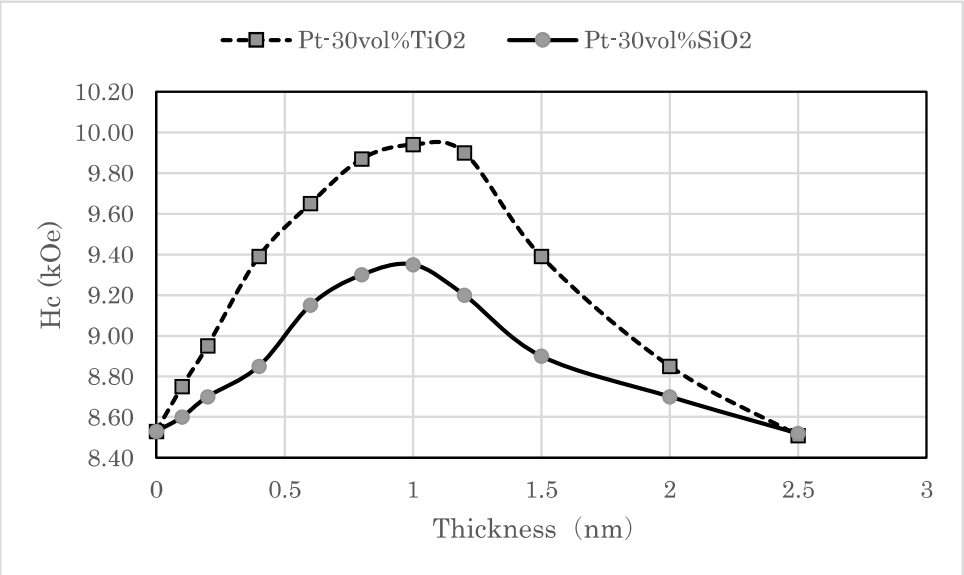

Pt-30vol%TiO2
Pt-30vol%SiO2
Hc (kOe)
10.20
10.00
9.80
9.60
9.40
9.20
9.00
8.80
8.60
8.40
0
0.5
1
1.5
2
2.5
3
Thickness（nm）

Fig. 6

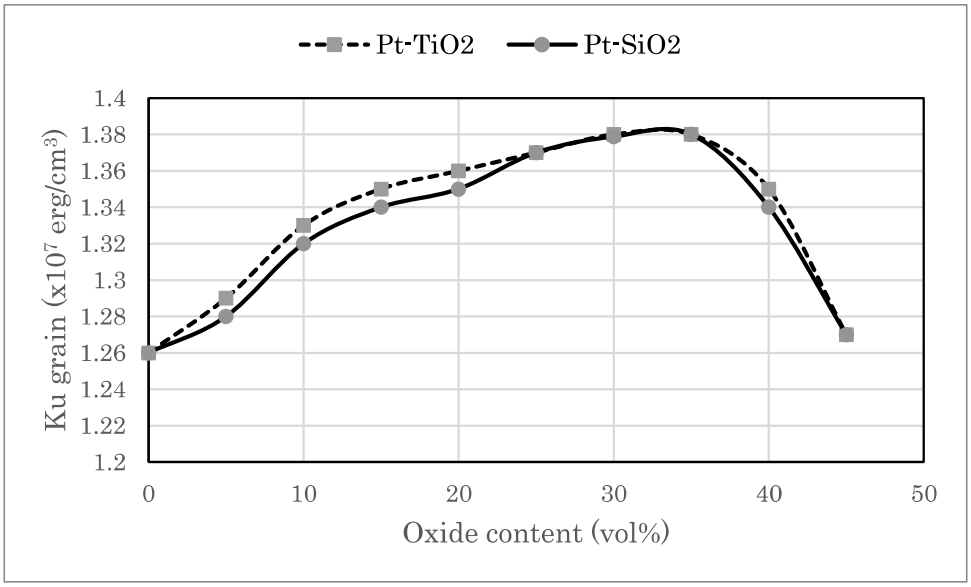

Pt-TiO2
Pt-SiO2
Ku grain (x10⁷ erg/cm³)
1.4
1.38
1.36
1.34
1.32
1.3
1.28
1.26
1.24
1.22
1.2
0
10
20
30
40
50
Oxide content (vol%)

Fig. 7

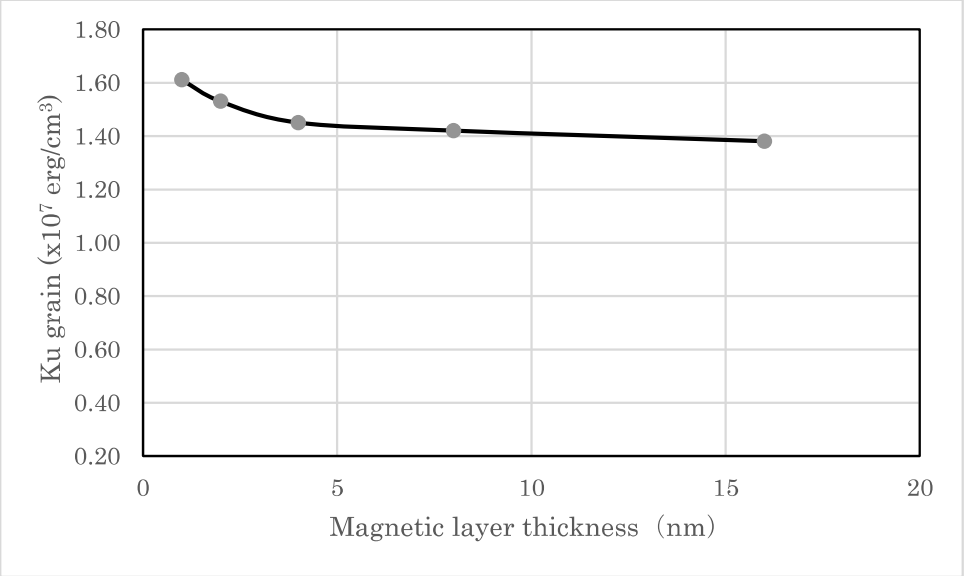

Ku grain (x10⁷ erg/cm³)
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0
5
10
15
20
Magnetic layer thickness（nm）

Fig. 8

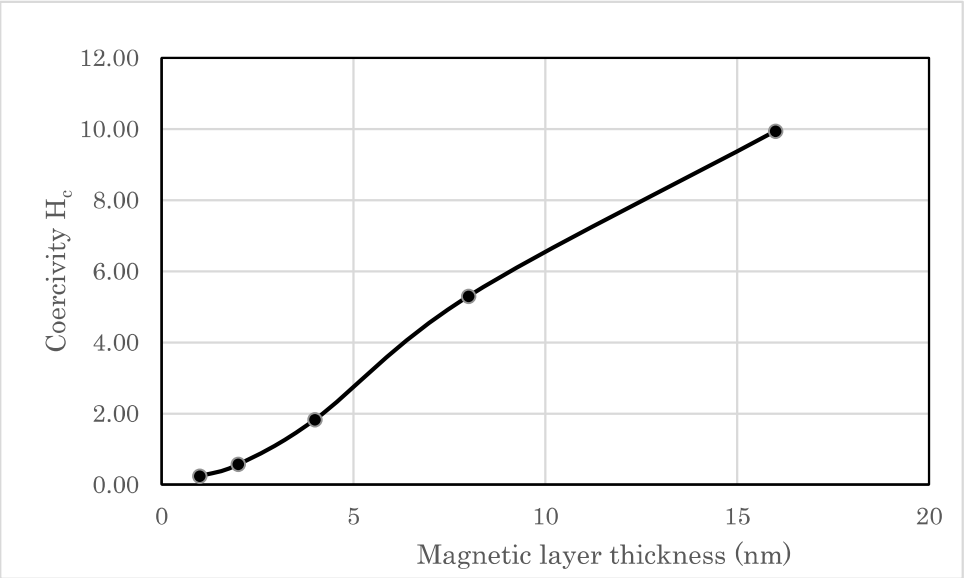

12.00
10.00
8.00
6.00
4.00
2.00
0.00
Coercivity H_c
0
5
10
15
20
Magnetic layer thickness (nm)

Fig. 9

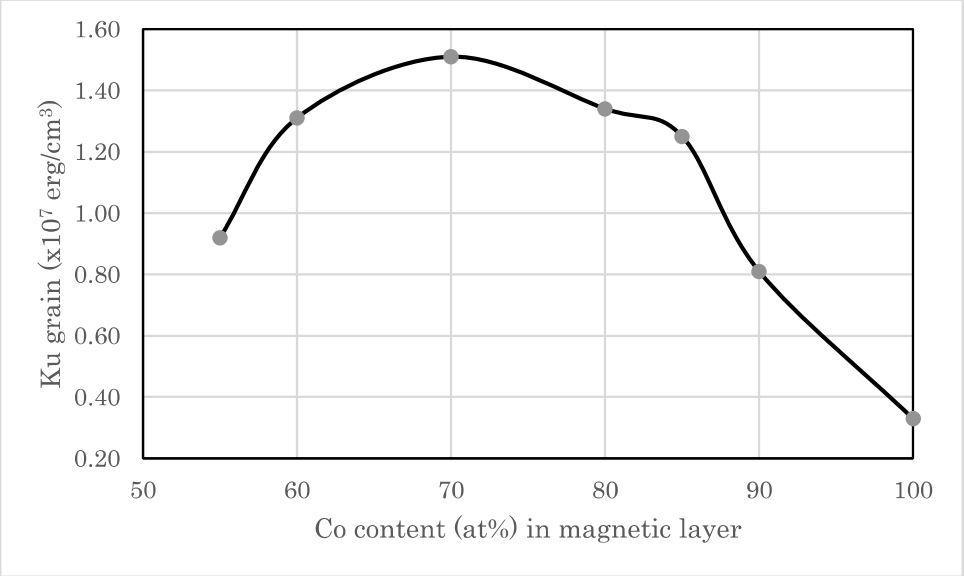

1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
Ku grain (x10^7 erg/cm^3)
50
60
70
80
90
100
Co content (at%) in magnetic layer

Fig. 10

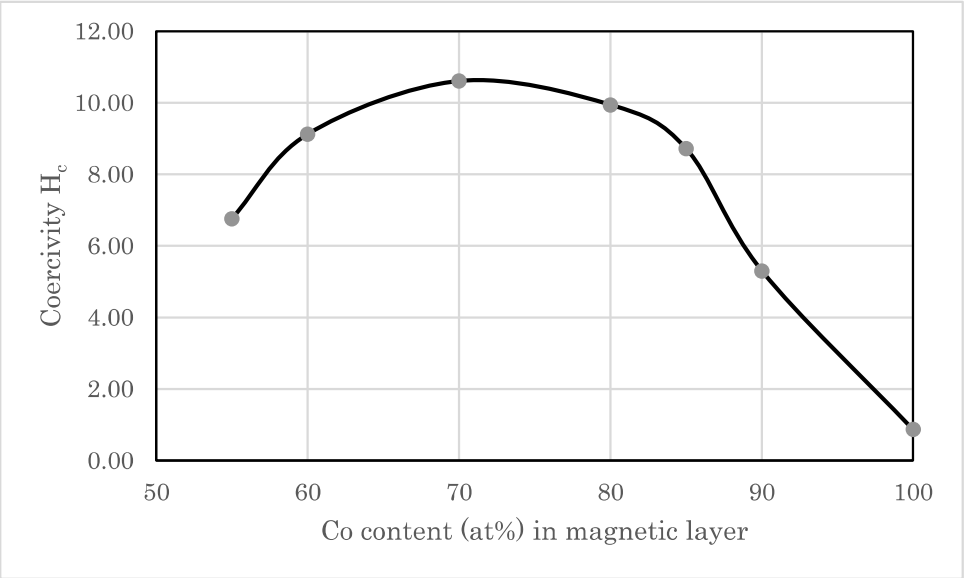

12.00
10.00
8.00
6.00
4.00
2.00
0.00
Coercivity H_c
50
60
70
80
90
100
Co content (at%) in magnetic layer

Fig. 11

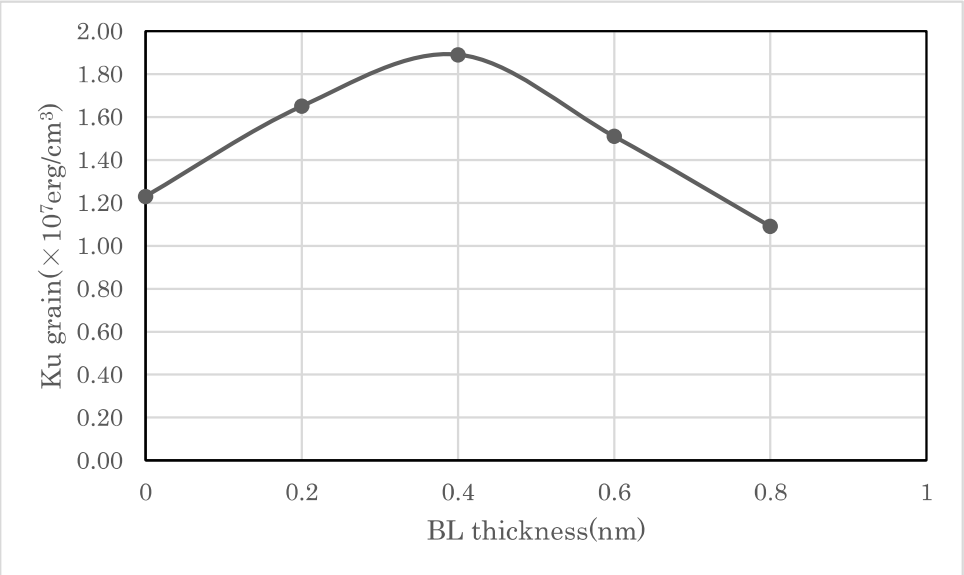

2.00
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
Ku grain($\times 10^7$erg/cm^3)
0
0.2
0.4
0.6
0.8
1
BL thickness(nm)

Fig. 12

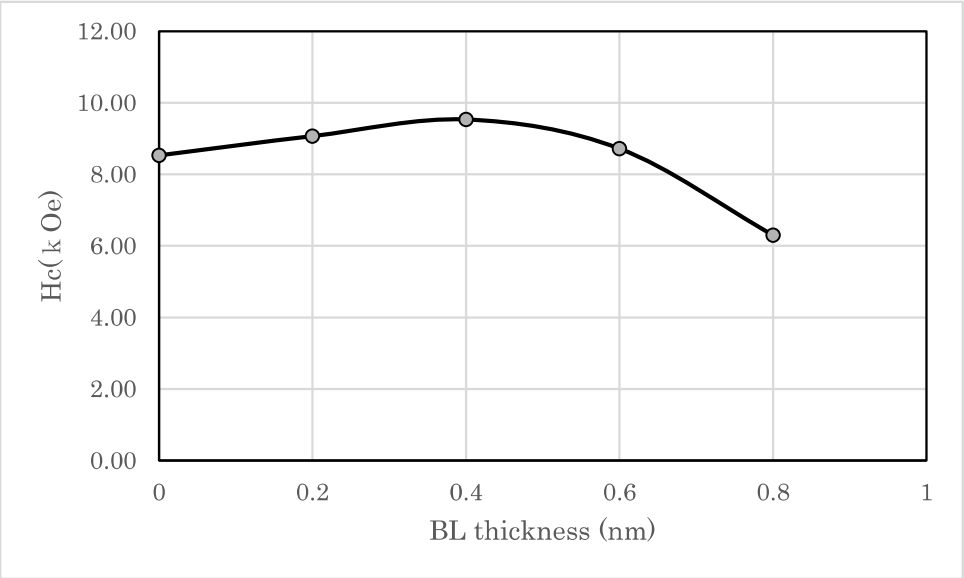

12.00
10.00
8.00
6.00
4.00
2.00
0.00
Hc(k Oe)
0
0.2
0.4
0.6
0.8
1
BL thickness (nm)

Fig. 13

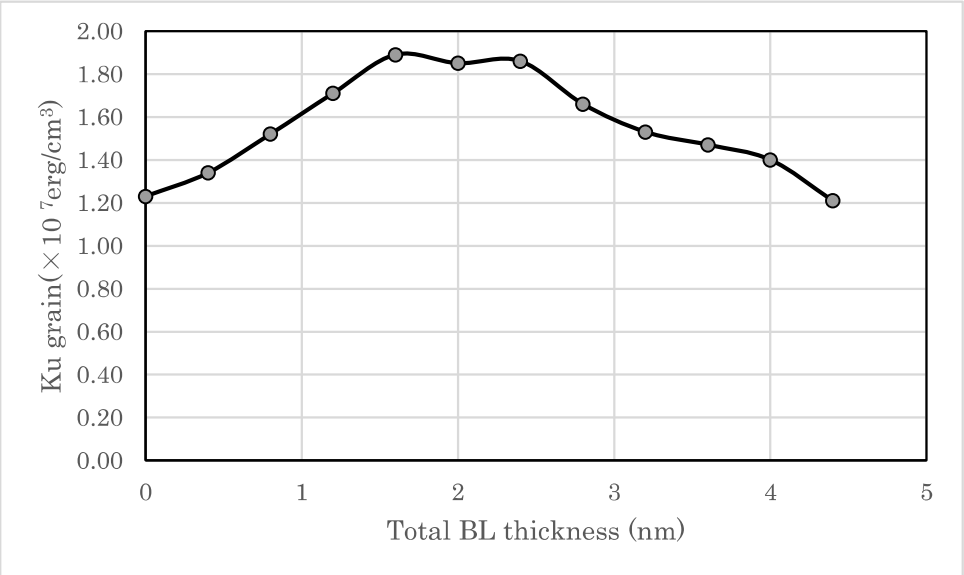
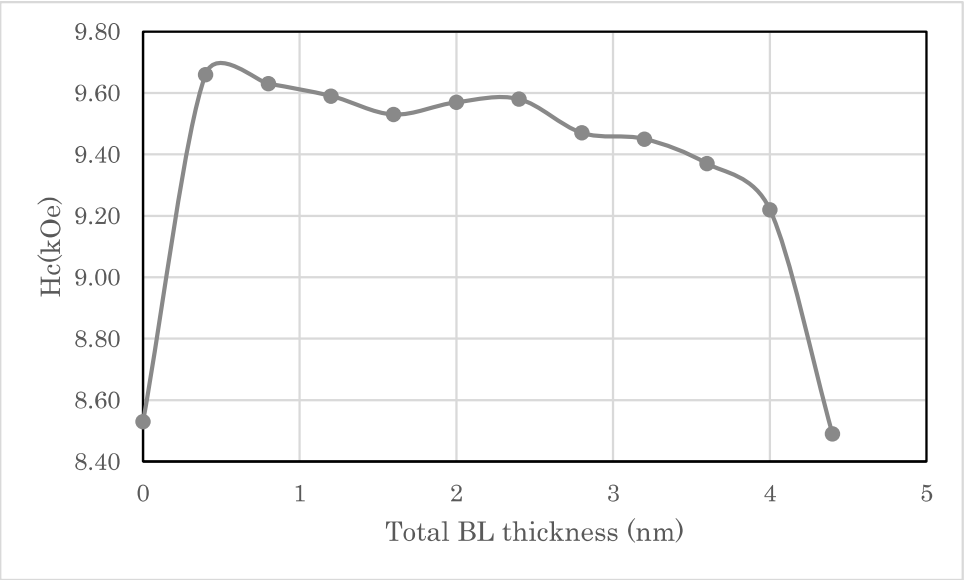

2.00
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
Ku grain(×10 7erg/cm3)
0
1
2
3
4
5
Total BL thickness (nm)

Fig. 14


9.80
9.60
9.40
9.20
9.00
8.80
8.60
8.40
Hc(kOe)
0
1
2
3
4
5
Total BL thickness (nm)