Ŝ M:ĎŎ

•nß¶ **ŏ́MÍ‰Ô**

¶MŽ,ĮB ïµjpÖ ß:

(DDU-1000) @ǿáµ k ǖµ ǘµ »˾ǟ šš >

(Conductive-atomic force microscopy, C-AFM) ÈĐÀ>

(NSOM)3ö

2-1 Ŀ

2-1-1 B̀(phase change) ŧ

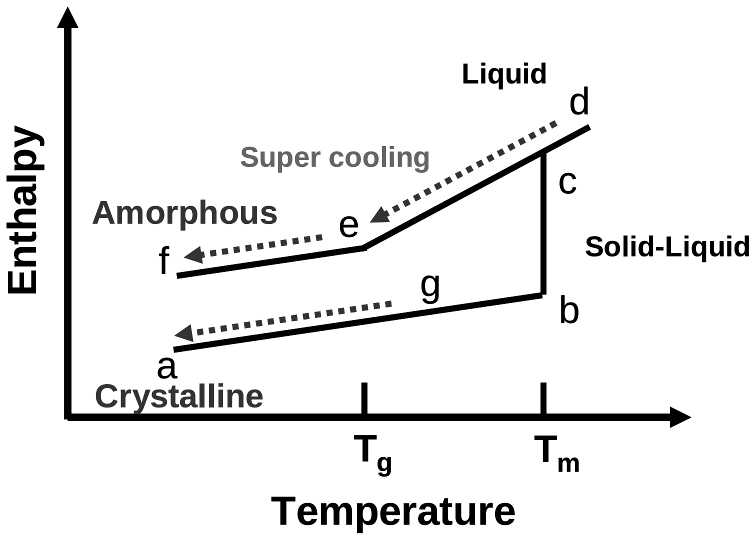
(\Bęę 1968 ô– S.R.Ovshinsky[27] ẉï

, (Chalcogenide)Í\ƒ²1 èĐ ǫ̃p̃Ö

ÊĎXŸ¨bǘ

ŷ GeSbTe ¶ AgInSbTe ¹ÀvǘkÂ

µ"ÆÀ'Bp̃ kǿ̃EYǘ



Ù 2.1 B̀öĸ¶(Enthalpy) Ð[29]ǒóĈ×
x3ŤEǿÀ3ŏ $_g$ ÄK(glass transition
temperature)ô T_m ÄK(melt temperature) ǟ-b-c-d x3Ä

C×ǂ%ÙĊ d-e-f x3ÁŽ-pà(amorphous)
x3ö f-e-g-a ÁC××HKäÚ×òBHö

ŞÖö@%Bç (T_m)À

HǩXnĎŠǩx3@

þn:ÈH%@l²

OŞ3ǨZô (quench)ǨQ

HÁþĎZbÈŞ

ÐÖÙ 2.1 ǨǨÖ0@

©²² Enthalpy Áô ÁÓ H=U+PVô U Å

P Á V ÓH)ÍH²²ô

0 Ú² h ÌÙÓô6 ²' B ïQ 0 " §â ÄĊ

dH=dU+P×dV+V×dPž dQ=dU+P×dVô dH=dQ+V×dPç

þBï,3×òÔx3pâ

ŽBïBx3È (Latent Heat)ÖÙ 2.1 ' b-c

ö

ĴÈ'Ć– (Gibbs free

energy)ÁĢ Ó G=U-TS+PVô S Á (entropy)ô TÁ

Kp"JÙ 2.2ÖHǩ ΔG ÈÊ²Ù

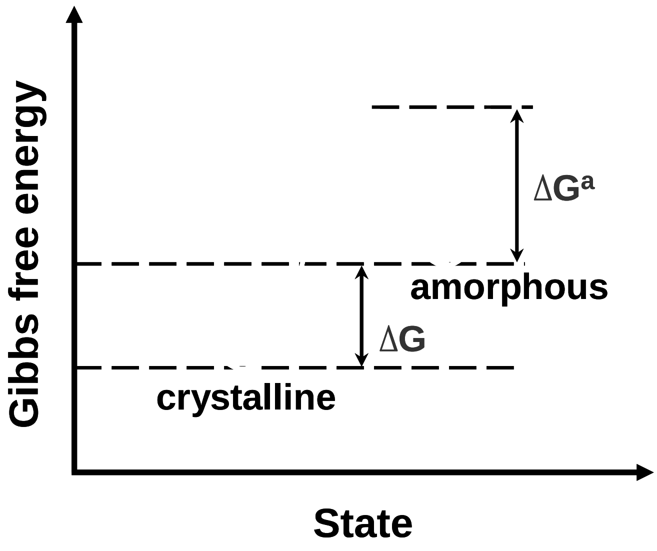
òBÁ ΔG_a OÊ (potential barrier)ö ΔG_a '

nŠÖ@ ΔG_a ÇÉ

ŽÁ ΔG_a µHÓnŞ

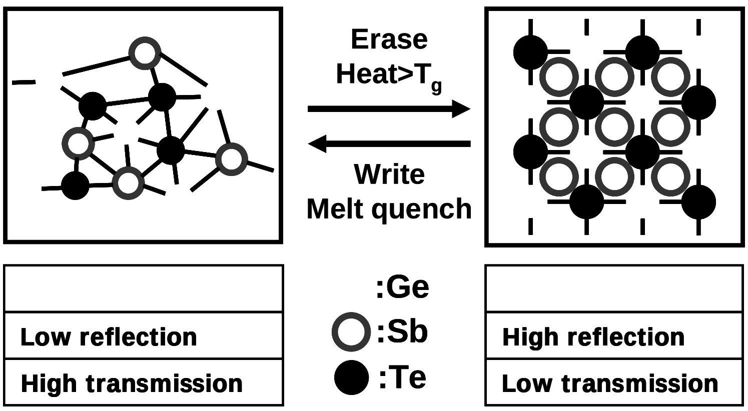
ÀÈBöBüpâ ΔG_a Ó

WÖǨ0W(Ǩö



Ù.2 HÔ”œ(Gibbs free energy) ñö

2-1-2 Bïìwþ



Ù 2.3 ÚH¶H,Ù

Bïõ :H² (Crystalline state)¶Ú

(Amorphous state)Ù— 2.3 QpH²H,µß

²H,ÈÔWh Ó ö—

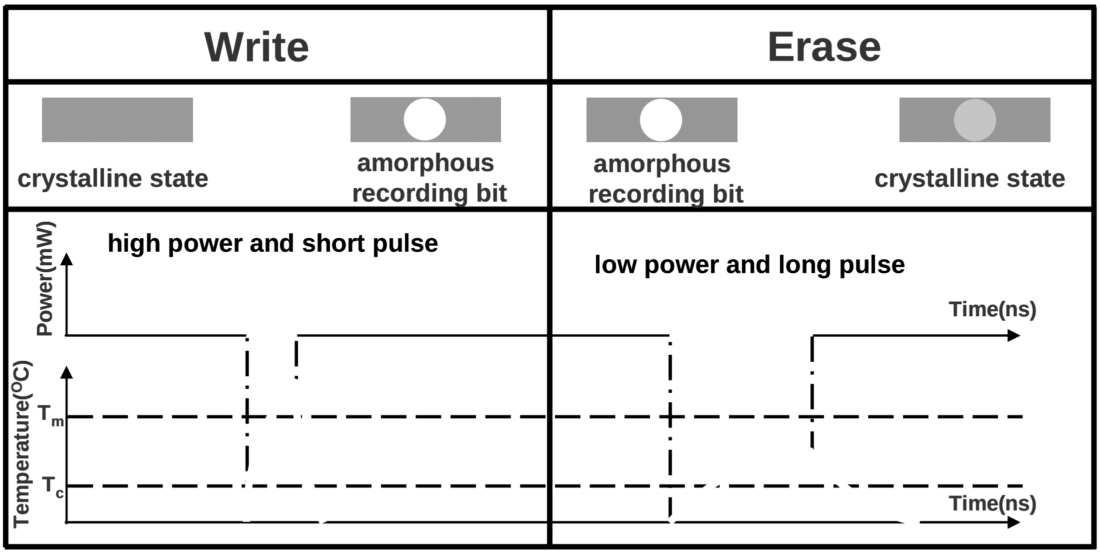
Ô×Õ,ô Èµ xµ ÈE

”×ìkBÎµkBìkÈ

ŏ‘ßúì

ÕH²ú

(erase)ÔÙ 2.4 ö



Ù 2.4 ÌÀ:Jµ@DW-ÇÁ

jDWËÇÁö

j• ÔDW-ÇÈÌÞjô

XEjcÙ.4 ÔþkKòÌR÷

'Yú (melting point)ÉYZö (quench)Ë

ÁÃ3ö

l¼DWÔËÇjÕ

ö¹l×ÆK×ÆÆK (Y1e'

K)Í1nYeÊl,ÔKpÊ

1qÌÉÁö

! ← 0hÔWÖö

µkÔ™w÷ H,ýÜÀ"

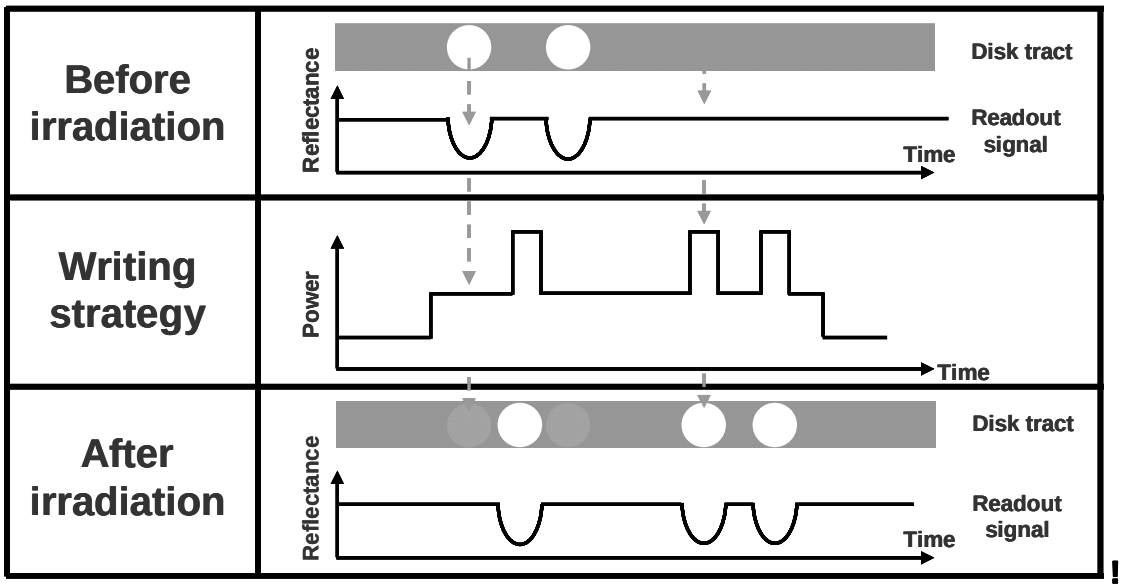
ÀÌÂÌÒÇô

ÅÁ 0ÊÖ ßÕÁWlõ

ÌQGw9Wö

2.5 (write power)

(erase power) (read power)



2.5 (Direct overwrite method recording) [28]

2-1-3

2.6 SPUTTER

(polycarbonate) bonding

Ù 2.6 B

!

! Protection layer

/DW-

B

ZnS-SiO_2(o 0:20) ZnSn

SiO_2

(1)× (2)

(3)H, (4)eä

× (erase)

W

/

H [30]

Ù [31]

B

Et Al-Tiõ Al-Crõ Al-Taõ Auõ Ag

(1) 85õ (2) (3)

2-2 ù

(RITEK) DVD+RW(4X)X

(DDU-1000)

2-2-1 (OB: DDU-1000)A

(Photo-detector)

48dB 0

(Carrier to Noise Ratio, CNR) 10% 0 (Jitter

(CNRj 48dBù Jitteri 10%)

DVD+RW (CNR) PULSTEC

DVD±R/±RW

DDU-1000 2.7

(Oscilloscope)

(Signal generator) (Pulse generator)

(Signal analyzer): (Spectrum analyzer)

(Disc driver box) (Laser diode controller)

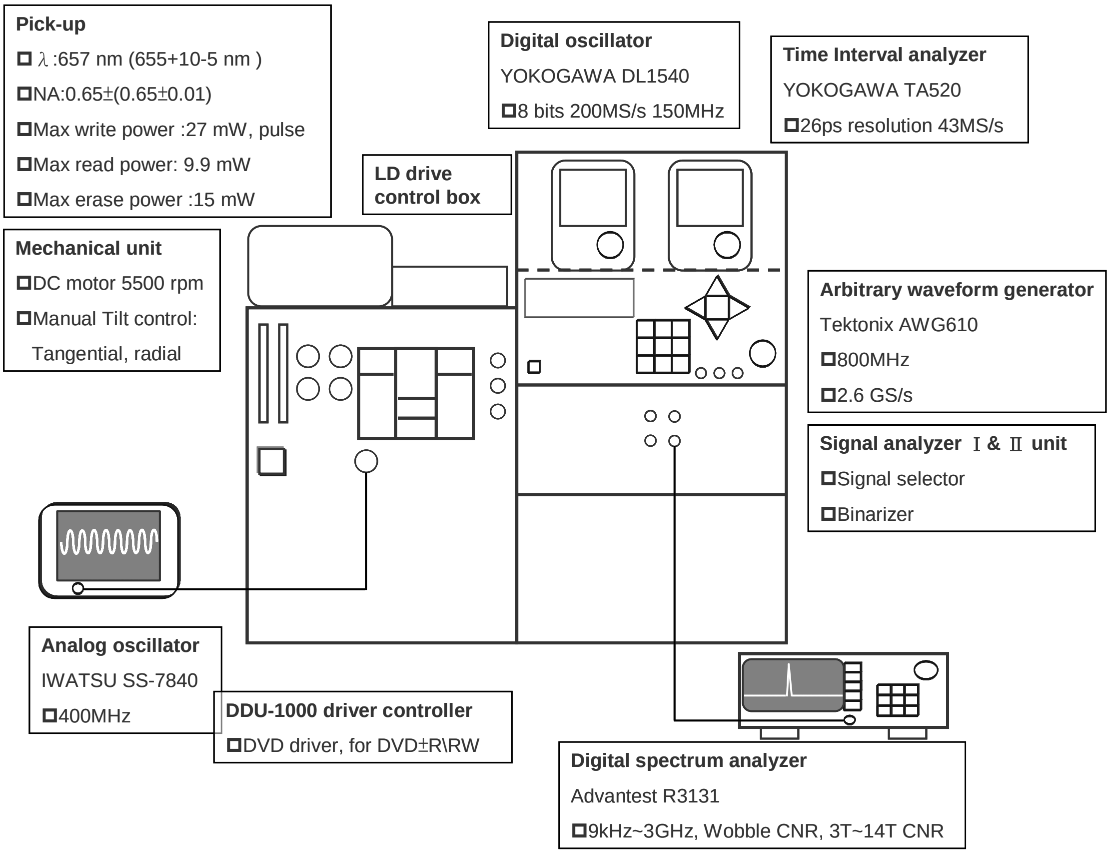
DVD±R/±RW

(CNR)ÀÀ¢..Ž (Land / Groove)

K (Wobble)ÀÀ'ÒO ÝÓW(Jitter) õ 3T~14T ÀÀ‘

Eye pattern ;X”ÀÀ'ÒWÒ0ÀÀ'f‘

õ



Ù 2.7 ÀÀB;Ù

ÀÀB;X”ÀÀ_ÔÈ

ÀÀ0ÿÀ@ÀÀ03ï

ÔµÀÀBwÔoQ0V—

ÀÀB_Ôp ÀÀ-

DWSBBÔ ÕVÈbÔ

(Pulse generator) ÀÀµ0ÉÀ"

oOkpÀÔ

µú»(Mark size)

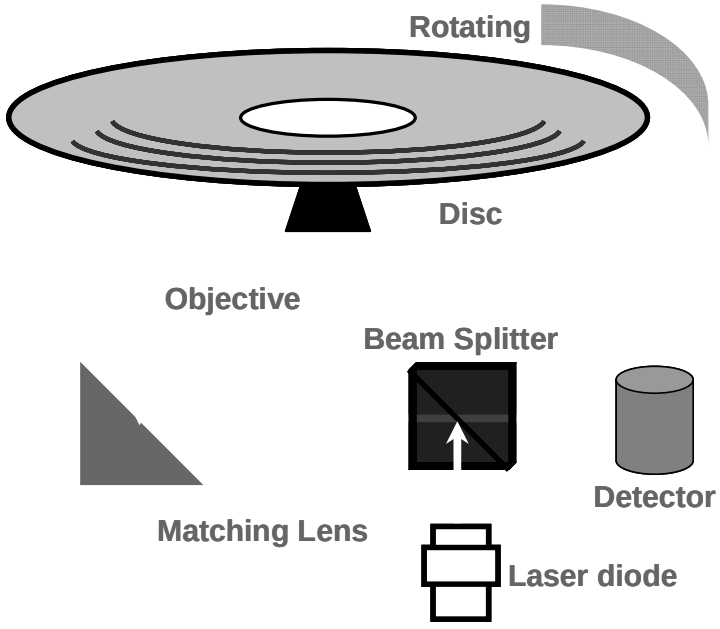
$$\frac{(1T \sim 28T) \times CLV}{2 \times Frequency} = \text{Mark size}$$

3T:

(Constant Angle Velocityô CAV)

(Constant Linear Velocity, CLV)

(Disc driver box)

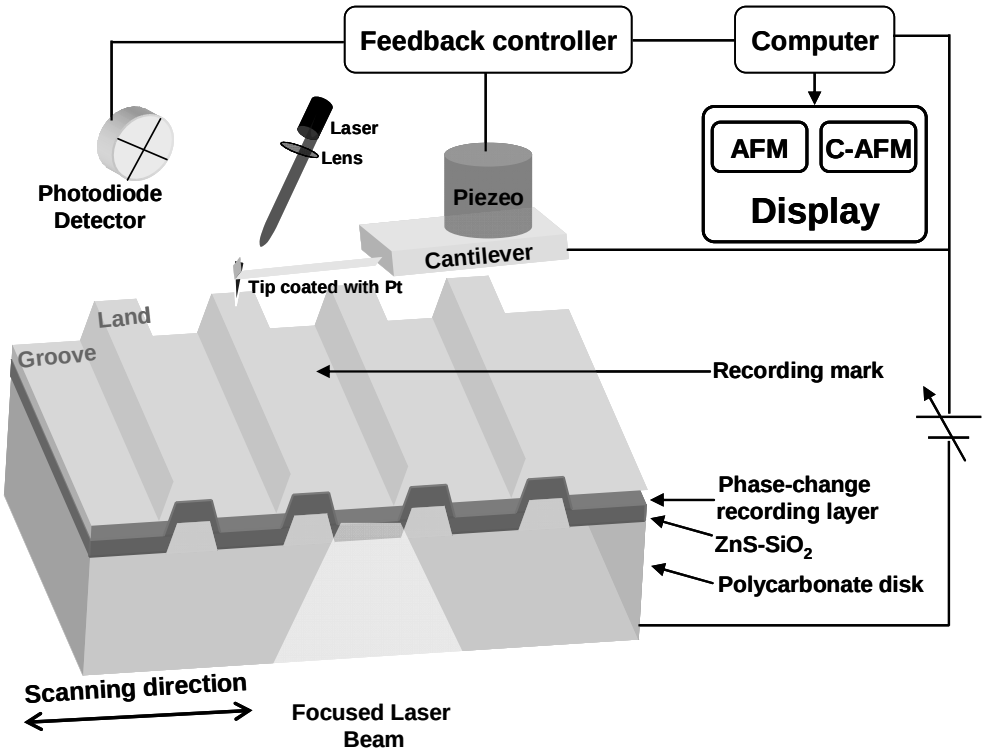


(Photo-detector)

2-2-2 **(Atomic force microscopy, AFM)**

(Conductive atomic force microscope, C-AFM) C-AFM

Veeco DI-3100 AFM (1) (contact mode) (2) (non- contact mode) (3) (tapping mode) 1-2-2 (1) (2) (3) (Lithography) DVD+RW NSOM Photodiode detector* DVD



(Colloidal Silver Paste)

(Pt)

(Pt)

20

C-AFM

(DI-3100)

(C-AFM)

(¬

Ù 2.10 (a)C…CøE 500nm µ(b) CDCøE 500nm µÐ
C-AFM yÖ½

2-3 (NSOM)

NTMDT

Solver SNOM

Topography) (NSOM)

(Shear force)" (1)

(2) (3)

(4) (5)

2-3-1

[32](Piezoelectric)

[33]

" "

6 (Tuning fork)

(Quartz wafer) 6c

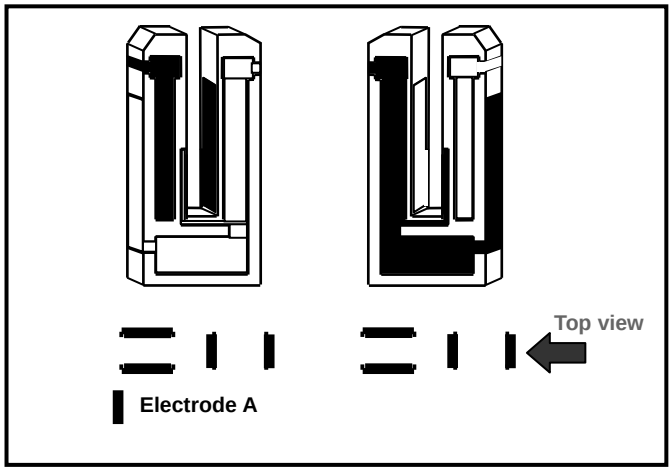
2.11 Q

( )

(nature resonance

frequency)

(wafer)



Ù 2.11 ¡cu

6 MI¡c VÁ 101 kHz Ù 2.12

(fiber)

Shear force O

(unction generator) o c

(5~10 ¼)

- 36 -

Ù2.12 ¡cõ ±8 KDS3H)U‘

2-3-2

D. W. Phol[34]

4¡s”

„ (tip) (nm)”é

200 E. Betzig[35]

(Micro-pipette)

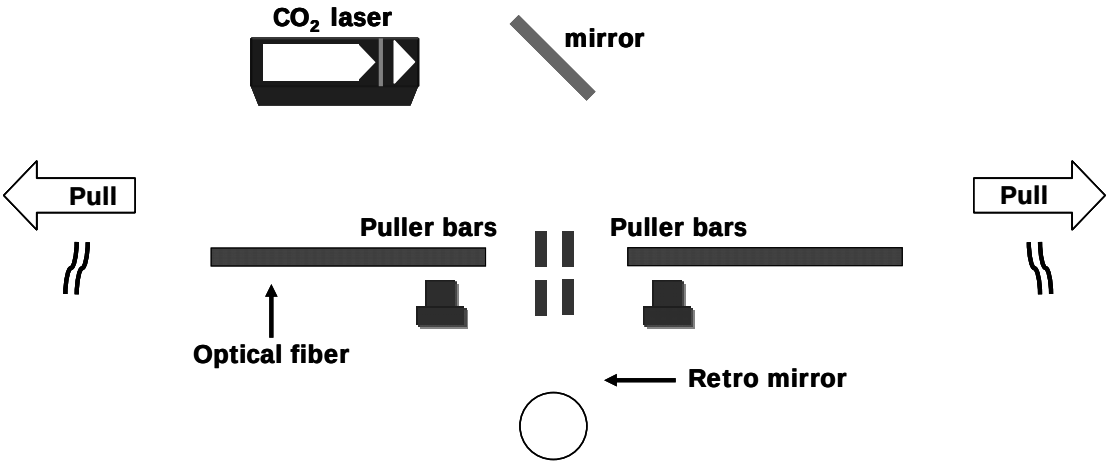
(Al)

100

10^{-5} 1989 R. C.

Reddick

I> (Photon Scanning Tunneling Microscope-PSTM) [36]


CO_2 laser
mirror
Pull
Puller bars
Puller bars
Pull
Optical fiber
Retro mirror

:‘ (Al)ô (Au)Œ (Pt)ö”[@Q0’

þÀ (confine)çToŒ

ŧÿVèPő

ðM;".ÃÕ 2.14 ð

ÂÉÌÈÃüŧ

UÔèkB,Oqç̃Ö

þ (tip)ÐVÕ3ýÀ

ŧŏÕ

ÁA1hÕé%AK (skin depth)hU

0ÕM§þbk̂ö

Ù 2.14 ÕÕ

2-3-3 [illegible]:

[illegible]

[illegible] :(1)[illegible] (2)[illegible]

X"' AFM 3[illegible] AFM [illegible]

[illegible] pW ‰ nW

[illegible] AFM [illegible] mW[illegible]

[illegible] (CNR),

[illegible]

)"[illegible]0[illegible]0[illegible]

[illegible] :[illegible]

[illegible]

[illegible]

[illegible]

[illegible] 2.15 [illegible]

[illegible] (Function generator)pà

[illegible]

[illegible] (Function generator)[illegible]

[illegible]

6[illegible] (Lock-in

Amplifier)[illegible]

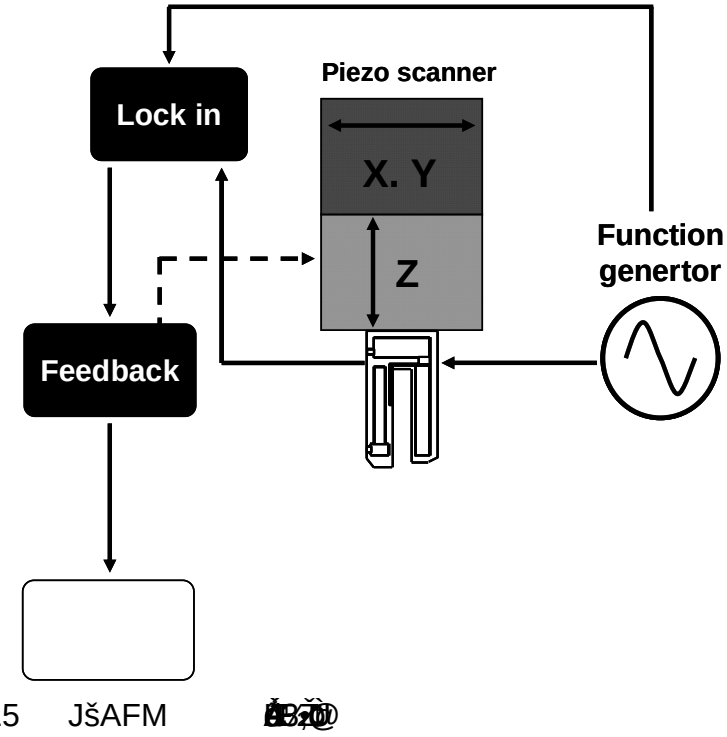
[illegible] (Sub-wavelength)[illegible]

• (Controller system)[illegible] (Scanning head)

[illegible]

(Piezo tube)

(AFM) (Topography)



2.15 JšAFM

2-3-4 [illegible]

[illegible] [illegible]

µ, NTMDT [illegible] (NSOM)[illegible]

Solver P47[illegible]

[illegible] [illegible]

[illegible]:

[illegible]

[illegible] 632.8 [illegible] (CW)[illegible] 12

mW[illegible], 500:1 W[illegible] (1)[illegible] (2)sIK/õ

(3)Qb[illegible] (4)[illegible]

[illegible](Neutral density filter)

[illegible] [illegible] (ì

B[illegible]

[illegible] (Fiber coupler)

[illegible]

[illegible]

[illegible] (Fiber

coupler)p:[illegible]

[illegible]

[illegible] x-y[illegible]

[illegible]

(Objective)

ÕMl" **µnW** 40 mm ÊÉ (N.A.)Á 0.6 ¢Ô

Æ**X6l'** (compensator)bÁ6ÕQ0ÕÕ

wH,K:6ö

!

!

Ù 2.16 6l'(compensator) ……yÕ[]Õ[37]ö

Ø6l' **(Compensator)**

6l'Q0…6tÕê ÕK wHô

b ÕÕ….Õ 2.16 ¢

2.17 Õ"-ÕH6Õ

l"d; ÕH6Õ"ÕpÆ ÕwH

K6ÕSK,Ql"ö

Õ.17 ÕÕÕP……Õ½[38]Õ

!

CCD (Charge couple device)

30 (640x480)

40 (tip)

(PMT)

Controller

(Lock-in amplifier)

chapper

chapper

chapper

5 Lock-in

amplifier) PMT

2-3-5

(fiber)

(ALTECO,SUPER GLUE)

6~8

(Scanning head)

¡c

(

”8

Q v

2.18

¢

(core)

(tip)

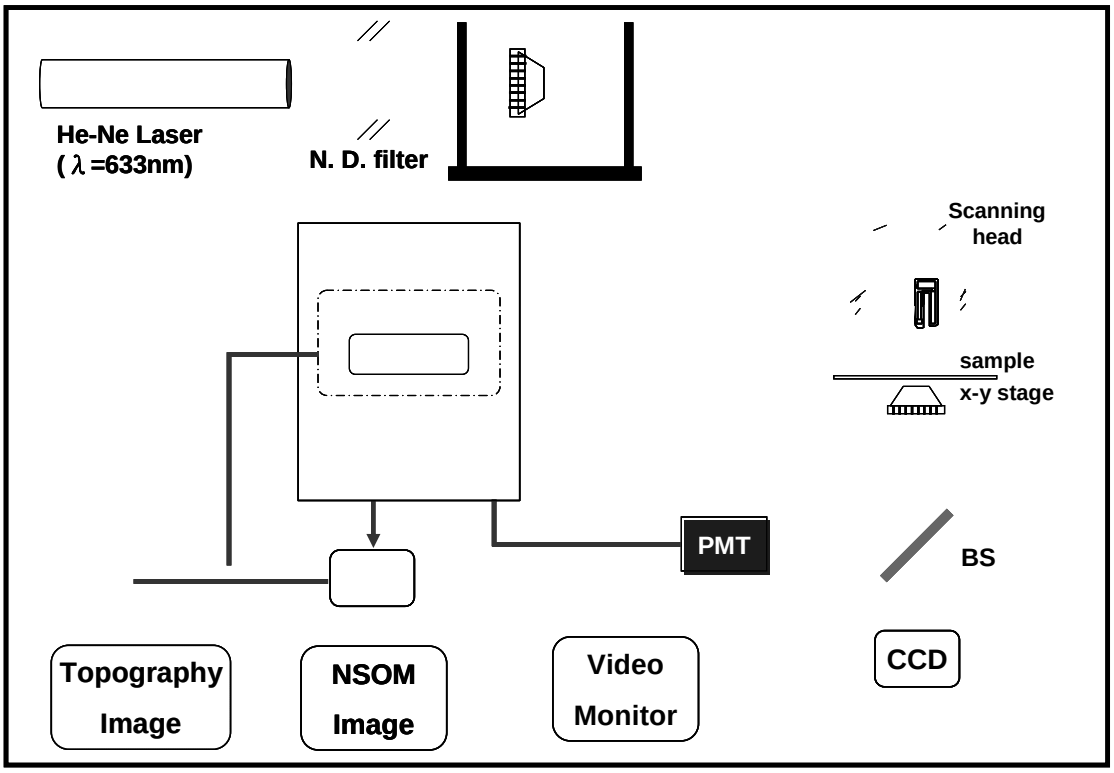
…

(PMT)

‰ Controller

(NSOM

NSOM



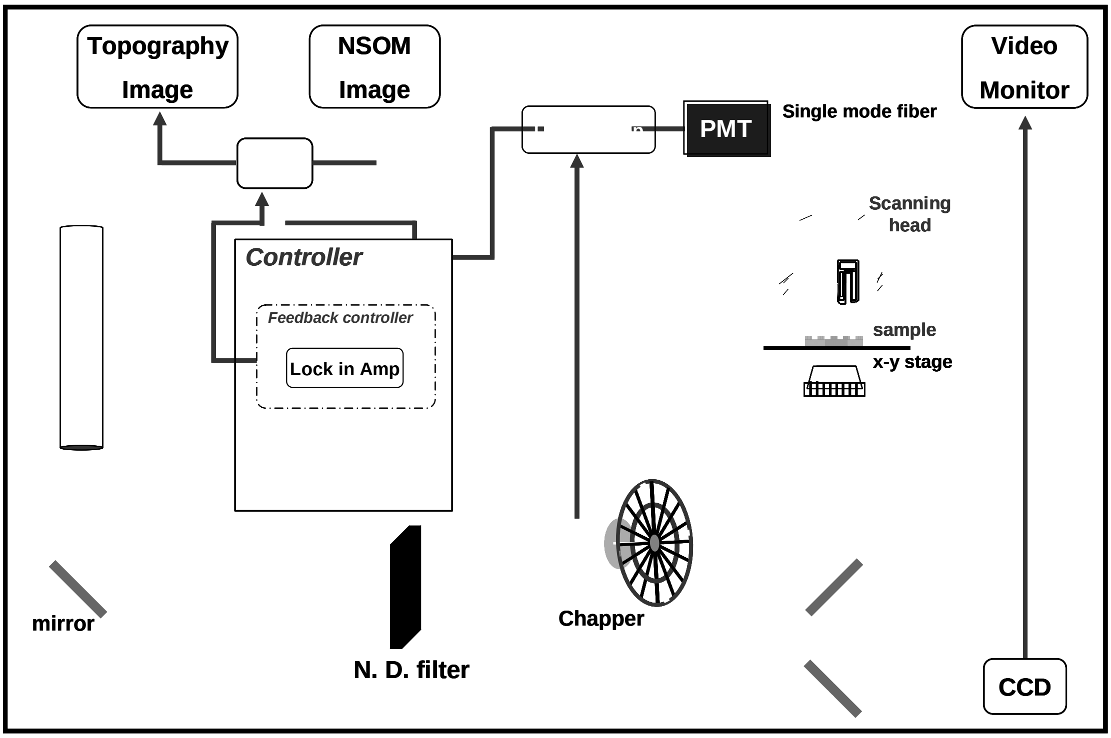
Ù 2.18

2.19

chapper pSBœ

chapper

Controller



Ù 2.19 À