

ภาคผนวก ก

แสดงรายละเอียดโปรแกรม CCR_Tc ชื่อเขียนด้วยภาษา QuickBASIC version 4.5 ของ
บริษัท ไมโครซอฟท์

```
DECLARE SUB Meas ()
DECLARE SUB MeasII ()
DECLARE SUB SMeasn ()
DECLARE SUB PDagall ()
DECLARE SUB PdataII ()
DECLARE SUB PgraphII ()
DECLARE SUB HeadII ()
DECLARE SUB LengthII ()
DECLARE SUB inII ()
DECLARE SUB SLenght ()
DECLARE SUB sHead ()
DECLARE SUB Sein ()
DECLARE SUB Oops ()
DECLARE SUB Test ()
DECLARE SUB ReadTempC ()
DECLARE SUB SetTempCout (cmd$)
DECLARE SUB InTempt ()
DECLARE SUB Pdata ()
DECLARE SUB pgraph ()
DECLARE SUB about ()
DECLARE SUB PDaga ()
DECLARE SUB SelectRe ()
DECLARE SUB SetDmm (cmd$)
DECLARE SUB ReadDmm ()
```

```
DECLARE SUB Lenght ()
DECLARE SUB in ()
DECLARE SUB SetScan (cmd$)
DECLARE SUB Chooses ()
DECLARE SUB Head ()
DECLARE SUB Tittle ()
DECLARE SUB Delay (sec!)
'$INCLUDE: 'ieeeqb.bi'
DIM SHARED cmd$, sec!, Na$
INITIALIZE 21, 0
CONST MIN = 1, num% = 900
CONST PI = 3.141593
SCREEN 9
DIM SHARED T#(num%), A!(15), Si, Are, Sol!, T!, r!(num%), q!(num%), Temp!(num%)
DIM SHARED Init%, IWD%, IRD%, Nad$, vd!, V3!(num%), Rv3!, n%, rj#, RC(num%),
DIM SHARED V2!, tb!, cc!, d%, p!(num%), aa$, INFO$, s!, Rmax!, V#, aKey$, save$,
DIM SHARED r2$, Oop$, p1!(num%), Solll!, A$, p2!(num%), End$, OP$, rch3!(num%)
10
Oop$ = "0"
Oops
cc! = 1: tb! = 0: r! = 0 : x = 0 : d% = 600
Na$ = "untitle.prm"
Rmax! = 2: RC! = 0: tc# = 0
SLenght
SetScan "RX"
SetDmm "R0F0X"
SetTempCout "F0KF1AKF3A2R4P99.I0.0D.0.0"
20
n% = 1
```

sHead

```
IF INFO$ = "about" THEN
    INFO$ = "10278"
    GOTO 20
END IF
IF OP$ = "0" THEN GOSUB OPENFILE
Sein
OPEN Na$ FOR OUTPUT AS #1
PRINT #1, ccl, Sol!, d%
    FOR i = 1 TO d%
        SMeasn
        n% = n% + 1
        IF End$ = "end" THEN EXIT FOR
        IF save$ = "save" THEN EXIT FOR
    NEXT
CLOSE #1
DO
    aa$ = INKEY$
    IF aa$ = CHR$(27) THEN END
LOOP UNTIL aa$ = CHR$(0) + CHR$(60)
SCREEN 0
SCREEN 9
n% = 0
save$ = "haha"
GOTO 10

SUB about
SCREEN 0
```

```
CLS
LOCATE 3, 14: PRINT CHR$(218);
FOR n = 1 TO 50
    PRINT CHR$(196);
NEXT
PRINT CHR$(191);
PRINT TAB(14);CHR$(179),TAB( 50);CHRR$(179)
LOCATE 5, 14
PRINT CHR$(179); " ***** Programme SCCT1 ***** "; CHR$(179)
PRINT TAB(14); CHR$(179); " "; CHR$(179)
PRINT TAB(14);CHR$(179);" The program of measurement the anisotropic";CHR$(179)
PRINT TAB(14);CHR$(179);" resistivity of single crystal was write by "; CHR$(179)
PRINT TAB(14);CHR$(179);" QB(QuickBasic version 4.5).If you would like ";CHR$(179)
PRINT TAB(14); CHR$(179);" to develop them ,please contact me.If you "; CHR$(179)
PRINT TAB(14); CHR$(179);" can't use it or anything else,please ask me. "; CHR$(179)
PRINT TAB(14); CHR$(179);" "; CHR$(179)
PRINT TAB(14); CHR$(179);" "; CHR$(179)
PRINT TAB(14); CHR$(179);" "; CHR$(179)
PRINT TAB(14); CHR$(179);" "; CHR$(179)
PRINT TAB(14); CHR$(179);" Miss.Nuchjira Dejang "; CHR$(179)
PRINT TAB(14); CHR$(179);" "; CHR$(179)
PRINT TAB(14); CHR$(179);" Update in 1998 "; CHR$(179)
PRINT TAB(14); CHR$(179);" <<<<Please,F10 to continue.>>>> "; CHR$(179)
PRINT TAB(14); CHR$(179);" "; CHR$(179)
PRINT TAB(14); CHR$(192);
FOR N=1 TO 50
    PRINT CHR$(196);
NEXT
```

```
PRINT TAB(14); CHR$(217)

xx = 1

DO
    b$ = INKEY$
    LOOP UNTIL b$ = CHR$(0) + CHR$(68)
IF xx = 1 THEN INFO$ = "about"
SCREEN 9
END SUB

SUB Chooses
DO
    aKey$ = INKEY$
    IF aKey$ = CHR$(0) + CHR$(59) THEN about
    IF aKey$ = CHR$(0) + CHR$(60) THEN open$ = "open"
    IF aKey$ = CHR$(0) + CHR$(61) THEN BEEP
    IF aKey$ = CHR$(0) + CHR$(62) THEN OP$ = "0"
    IF aKey$ = CHR$(27) THEN END
LOOP UNTIL open$ = "open" OR INFO$ = "about" OR OP$ = "0"
END SUB

SUB Delay (sec!)
START! = TIMER + sec!
aKey$ = INKEY$
WHILE ABS(START! > TIMER)
    SELECT CASE aKey$
        CASE CHR$(27)
            End$ = "end"
            EXIT SUB
        CASE IS = CHR$(0) + CHR$(61)
            save$ = "save"
```

```

EXIT SUB
END SELECT
WEND
END SUB

```

SUB Head

CLS

PRINT "_____□ Measurement of Anisotropic

Resistivity□_____";CHR\$(191)

PRINT CHR\$(175);FOR N =1 TO 27 :PRINT CHR\$(196);:NEXT ;PRINT" Resistivity
(mOhm-mm.) _____";CHR\$(1979)

PRINT CHR\$(179); " No Temp(K) P(mOh-mm.) ";CHR\$(179);TAB(50);CHR\$(191)

PRINT CHR\$(195);"_____";CHR\$(180);TAB(50);

CHR\$(179)

FOR n = 1 TO 11

PRINT CHR\$(179) " _____";CHR\$(179);" _____";CHR\$(179)

NEXT

PRINT CHR\$(179) " _____";CHR\$(179);" 0 50 100 150 200 250 300";CHR\$(179)

PRINT CHR\$(195)"_____ Temperature(°K) "

; CHR\$(180)

PRINT CHR\$(195)" File name : untitled.pm _____";CHR\$(218) ;"_____"; CHR\$(194);

"_____";CHR\$(191);" _____";CHR\$(179)

PRINT CHR\$(195)" Current source : 1.0 mA. _____";CHR\$(195);" T1(≈K) n L/A(1/mm.)"

;CHR\$(195);" " ; CHR\$(195)

```

PRINT CHR$(195);" Data points : 600 ";CHR$(195);"—————";CHR$(197);"—————";CHR$(180);" "; CHR$(195)
PRINT CHR$(195);" Reff.Temperature :  °K ;" CHR$(195);"      ";CHR$(195);
"      ";CHR$(195);"      "; CHR$(195)
PRINT CHR$(195);"      ";CHR$(192);"—————";CHR$(193);"
—————      ";CHR$(179)
PRINT CHR$(192)" — [F1-ABUOT]-[F2-NEW]-[F3-SAVE]-[F4-OPEN]-[ESC-Exit] —————
—————";CHR$(217)
LOCATE 21, 47: PRINT USING "###.###"; Sol!
pgraph
Chooes
END SUB

SUB Headll
CLS
PRINT "—————☐Measurement of Anisotropic Resistivity☐—————"
PRINT CHR$(195);"—————";CHR$(191);" Resistivity(mOhms.-mm) "
; CHR$(179)
PRINT CHR$(179)" No Temp(K) P1(mOhm.-mm)";CHR$(179);"      ";CHR$(179)
PRINT CHR$(195);"—————";CHR$(180);TAB(50);CHR$(179)
FOR n = 1 TO 6
PRINT CHR$(179)"      ";CHR$(179);"      ";CHR$(179)
NEXT

PRINTCHR$(195);"—————";CHR$(217);TAB(50);CHR$(179)
PRINT CHR$(179)"      ";CHR$(179);"      ";CHR$(179)
PRINT CHR$(195);"—————";CHR$(191);TAB(50);CHR$(179)
PRINT CHR$(179)" No Temp(K) P1(mOhm.-mm)";CHR$(179);"      ";CHR$(179)

```

```

PRINT CHR$(195);"-----";CHR$(180);TAB(50);CHR$(179)
PRINT CHR$(179)"  ";CHR$(179);"  0  50  100  150  200  250 300";CHR$(179)
PRINT CHR$(179);"          ";CHR$(179);"          Temperature(oK)          ";CHR$(179)
PRINT CHR$(179);"          ";CHR$(218);"-----";CHR$(191);"          File name
: untitled.prm ";CHR$(179)
PRINT CHR$(179);"          ";CHR$(179);" Temref(K) ";CHR$(179);"          Current
source : 1.0 mA. ";CHR$(179)
PRINT CHR$(179);"          ";CHR$(195);"-----";CHR$(180);"          Data
points : 600      ";CHR$(179)
PRINT CHR$(179);"          ";CHR$(179);"          ";CHR$(179);" Reff.Temperature oK" ;
CHR$(179)
PRINT CHR$(195);"-----";CHR$(217);"          ";CHR$(179)
PRINT CHR$(192)" --- [F1-ABUOT]-[F2-NEW]-[F3-SAVE]-[F4-OPEN]-[ESC-Exit] ---
-----";CHR$(217)

pgraph
Chooes
END SUB

SUB in
LOCATE 18, 4
oldna$ = Na$
INPUT "File name : ", Na$
IF Na$ = "" OR Na$ = "Untitled.prm" THEN Na$ = oldna$
IF INSTR(Na$, ".") = 0 THEN Na$ = Na$ + ".prm"
LOCATE 18, 4 : PRINT "File name : "; Na$; "  "
LOCATE 19, 4

oldc! = cc!
INPUT "Current source : ", cc!

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IF cc! = 0 THEN cc! = oldc!

LOCATE 19, 4

PRINT USING "Current source : ##.##"; cc!

cc! = cc! / 1000

LOCATE 20, 4

oldd% = d%

INPUT "Data points : ", d%

IF d% = 0 THEN d% = oldd%

LOCATE 20, 4

PRINT USING "Data points : ###"; d%

LOCATE 21, 4

oldrt# = rt#

INPUT "Reff.Temperature :", rt#

IF rt# = 0 THEN rt# = oldrt#

LOCATE 21, 4

PRINT USING "Reff.Temperature : ##.##"; rt#

END SUB

SUB inll

LOCATE 18, 54

oldna\$ = Na\$

INPUT "File name : ", Na\$

IF Na\$ = "" OR Na\$ = "Untitled.prm" THEN Na\$ = oldna\$

IF INSTR(Na\$, ".") = 0 THEN Na\$ = Na\$ + ".prm"

LOCATE 18, 54

PRINT "File name : "; Na\$; " "

LOCATE 19, 54

oldc! = cc!

INPUT "Current source : ", cc!

IF cc! = 0 THEN cc! = oldc!

LOCATE 19, 54

PRINT USING "Current source : ##.##"; cc!

cc! = cc! / 1000

LOCATE 20, 54

oldd% = d%

INPUT "Data points : ", d%

IF d% = 0 THEN d% = oldd%

LOCATE 20, 54

PRINT USING "Data points : ### "; d%

LOCATE 21, 54

oldrt# = rt#

INPUT "Reff.Temperature :", rt#

IF rt# = 0 THEN rt# = oldrt#

LOCATE 21, 54

PRINT USING "Reff.Temperature : ##.##"; rt#

END SUB

SUB Lenght

LOCATE 3, 14: PRINT CHR\$(201) ;

FOR n = 1 TO 50

PRINT CHR\$(205);

NEXT

PRINT CHR\$(187)

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PRINT TAB(14);CHR$(186); "                                "; CHR$(186);
PRINT TAB(14); CHR$(186);" ***** Size of Sample ***** "; CHR$(186);
PRINT TAB(14);CHR$(186); "                                "; CHR$(186);
PRINT TAB(14);CHR$(186);" "-----";CHR$(218);" " ;CHR$(186)
PRINT TAB(14);CHR$(186); "      ";CHR$(179);" 1  2  3  4  ";CHR$(186);
"                                " ; CHR$(186);
PRINT TAB(14) CHR$(186); "      ";CHR$(197);" " ;CHR$(197);" " CHR$(186)
PRINT TAB(14) CHR$(186); " -----";CHR$(197);" — . . . —";CHR$(197)
; " -----"; CHR$(186)
PRINT TAB(14) CHR$(186); " (I+) ";CHR$(179);" " ;CHR$(179);" " ;CHR$(179);"
";CHR$(179);" " ;CHR$(186)
PRINT TAB(14) CHR$(186); "      ";CHR$(192);" —";CHR$(197);" — ";
CHR$(197) —";CHR$(217)      ";CHR$(186)
PRINT TAB(14) CHR$(186); "      ";CHR$(179);" " ;CHR$(179);" " ;
CHR$(186)
PRINT TAB(14) CHR$(186); "      ";CHR$(192);" V ";CHR$(217);" " ;
CHR$(186)
PRINT TAB(14); CHR$(186); "                                ";CHR$(186)
PRINT TAB(14); CHR$(186); " Distance between points 2 to 3 :      mm. ";CHR$(186)
PRINT TAB(14); CHR$(186); "                                ";CHR$(186)
PRINT TAB(14); CHR$(186); " Area cross-section      =      mm.^2 ";CHR$(186)
PRINT TAB(14); CHR$(186); "                                ";CHR$(186)
PRINT TAB(14); CHR$(186); " The measurement of anisotropic resistivity ";CHR$(186)
PRINT TAB(14); CHR$(186); "                                ";CHR$(186)
PRINT TAB(14); CHR$(186); " Channel use 2 or 3 : ";CHR$(186)
PRINT TAB(14);CHR$(200);
FOR n= 1 TO 49
    PRINT CHR$(205) ;
NEXT

```

PRINT TAB(14);CHR\$(188)

DO

LOCATE 15, 52: INPUT "", Si

LOCATE 17, 46: INPUT "", Are

LOCATE 21, 46: INPUT "", A\$

IF Si = 0 THEN BEEP

IF Are = 0 THEN

Si = 0

BEEP

END IF

IF A\$ <> "2" AND A\$ <> "1" THEN A\$ = "1"

LOOP UNTIL Si <> 0

SolI = Are / Si

END SUB

SUB LengthII

LOCATE 3, 14: PRINT CHR\$(201);

FOR n = 1 TO 50

PRINT CHR\$(205);

NEXT

PRINT CHR\$(187)

PRINT TAB(14);CHR\$(186); " "; CHR\$(186);

PRINT TAB(14); CHR\$(186);" ***** Size of Sample ***** "; CHR\$(186);

PRINT TAB(14);CHR\$(186); " "; CHR\$(186);

PRINT TAB(14);CHR\$(186);" ";CHR\$(218);" ";CHR\$(186)

PRINT TAB(14);CHR\$(186);" ";CHR\$(179);" 1 2 3 4 ";CHR\$(186);

" "; CHR\$(186);

```

PRINT TAB(14) CHR$(186); "      ";CHR$(197);"  ";CHR$(197);"  " CHR$(186)
PRINT TAB(14) CHR$(186); "  ———";CHR$(197);" — . . . —";CHR$(197)
; "  ———"; CHR$(186)
PRINT TAB(14) CHR$(186); " (I+) ";CHR$(179);"  ";CHR$(179);"  ";CHR$(179);"
";CHR$(179);"  ";CHR$(186)
PRINT TAB(14) CHR$(186); "      ";CHR$(192);" ———";CHR$(197);" — ";
CHR$(197) ———";CHR$(217)      ";CHR$(186)
PRINT TAB(14) CHR$(186); "      ";CHR$(179);"  ";CHR$(179);"      ";
CHR$(186)
PRINT TAB(14) CHR$(186); "      ";CHR$(192);" V ";CHR$(217);"      ";
CHR$(186)
PRINT TAB(14); CHR$(186); "      ";CHR$(186)
PRINT TAB(14); CHR$(186); "  Distance between points 2 to 3 :      mm. ";CHR$(186)
PRINT TAB(14); CHR$(186); "  1.Distance between pionts 2 to 3 :      mm. ";CHR$(186)
PRINT TAB(14); CHR$(186); "  Area cross-section (CH2)=      mm.^2 ";CHR$(186)
PRINT TAB(14); CHR$(186); "  2.Distance between pionts 2 to 3 :      mm. ";CHR$(186)
PRINT TAB(14); CHR$(186); "  Area cross-section (CH3)=      mm.^2 ";CHR$(186)
PRINT TAB(14); CHR$(186); "  The measurement of anisotropic resistivity ";CHR$(186)
PRINT TAB(14); CHR$(186); "      ";CHR$(186)
PRINT TAB(14); CHR$(186); "  Note : Please,input them. ";CHR$(186)
PRINT TAB(14);CHR$(200);
FOR n= 1 TO 49
    PRINT CHR$(205) ;
NEXT
PRINT TAB(14);CHR$(188)

DO
    LOCATE 15, 52: INPUT " ", Si!
    LOCATE 16, 46: INPUT " ", Ar!

```

```
LOCATE 17, 52: INPUT "", Si!  
LOCATE 18, 46: INPUT "", Ar!  
IF Si! = 0 THEN BEEP  
IF Ar! = 0 THEN  
    Si! = 0  
    BEEP  
END IF  
LOOP UNTIL Si! <> 0  
Sol! = Ar! / Si!  
Soll! = Ar! / Si!  
END SUB
```

SUB Meas

cmd\$ = "B" + A\$ + "XC" + A\$ + "X"

SetScan cmd\$

Delay (2)

ReadDmm

V3! = VAL((MID\$(Nad\$, 5, 16))) * 1000

r!(n%) = V3! * Sol! / (cc!)

Test

pgraph

Pdata

PDaga

END SUB

SUB MeasII

SetScan "N1XB2XC2X"

Delay (2)

ReadDmm

V2! = VAL((MID\$(Nad\$, 5, 16))) * 1000

p1!(n%) = V2! * Sol! / (cc!)

Test

SetScan "N2XB1XC1X"

Delay (2)

ReadDmm

V3! = VAL((MID\$(Nad\$, 5, 16))) * 1000

p2!(n%) = V3! * Sol! / (cc!)

PgraphII

PdataII

PDagall

Delay (2)

END SUB

SUB Oops

DO

LOCATE 1, 5: INPUT "Munber Sample ,1 or 2 . = ", Oop\$

LOOP UNTIL Oop\$ = "1" OR Oop\$ = "2"

END SUB

SUB PDaga

j% = 0

IF n% <= 12 THEN

LOCATE n% + 4, 3

PRINT USING "### ##.## ###.## "; n%; T#(n%); r!(n%)

END IF

IF n% > 12 THEN

FOR K% = n% - 11 TO n%

L% = 5 + j%

```
        LOCATE L%, 3
        PRINT USING "### ##.## ###.##"; K%; T#(K%); r!(K%)
        j% = j% + 1
    NEXT
END IF
IF aa$ = CHR$(0) + CHR$(61) THEN CLOSE #1
END SUB

SUB PDagall
j% = 0
IF n% <= 5 THEN
    LOCATE n% + 4, 3
    PRINT USING "### ##.## ###.##"; n%; T#(n%); p1!(n%)
    LOCATE 15 + n%, 3
    PRINT USING "### ##.## ###.##"; n%; T#(n%); p2!(n%)
END IF

IF n% > 5 THEN
    FOR K% = n% - 5 TO n%
        L% = 5 + j%
        LOCATE L%, 3
        PRINT USING "### ##.## ###.##"; K%; T#(K%); p1!(K%)
        x% = 16 + j%
        LOCATE x%, 3
        PRINT USING "### ##.## ###.##"; K%; T#(K%); p2!(K%)
        j% = j% + 1
    NEXT
END IF
END SUB
```

SUB Pdata

PRINT #1, n%, T#(n%), r!(n%), Temp!(n%)

END SUB

SUB PdataII

PRINT #1, n%, T#(n%), p1!(n%), p2!(n%), Temp!(n%)

END SUB

SUB pgraph

IF r!(n%) < .05 AND T#(n%) > tc# THEN tc# = T#(n%): RC! = r!(n%)

IF r!(n%) > Rmax! OR n% = 1 THEN

DO UNTIL Rmax! > r!(n%)

Rmax! = 2 * Rmax!

LOOP

LOCATE 3, 32 : PRINT USING "####.#"; Rmax!

LOCATE 6, 32 : PRINT USING "####.#"; .75 * Rmax!

LOCATE 9, 32 : PRINT USING "####.#"; .5 * Rmax!

LOCATE 12, 32 : PRINT USING "####.#"; .25 * Rmax!

WINDOW (0, 0)-(300, Rmax!)

VIEW (299, 35)-(634, 205), 0, 7

Ymin! = 0

Ymax! = Rmax!

Gridx% = 10

Gridy! = Ymax! / 20

xinterval% = 50

DO

IF Gridx% MOD xinterval% = 0 THEN q! = .97 ELSE q! = .99

LINE (Gridx%, 0)-(Gridx%, Ymax! - Ymax! * q!), 15

```
IF q! = .97 THE LINE (Gridx%, 0)-(Gridx%, Ymax!), 7, , &HAAAA
LINE (0, Gridy! * 5)-(300, Gridy! * 5), 7, , &H4924
Gridx% = Gridx% + (xinterval% / 5)
Gridy! = Gridy! + (Ymax! / 20)
LOOP UNTIL Gridx% >= 300
FOR j% = 1 TO n%
    CIRCLE (T#(j%), r!(j%)), 1, 15
NEXT j%
ELSE
    CIRCLE (T#(n%), r!(n%)), 1, 15
END IF
END SUB

SUB Pgraph!!
    IF p1!(n%) >= p2!(n%) THEN
        rot! = p1!(n%)
    ELSE
        rot! = p2!(n%)
    END IF
    IF rot! < .05 AND Temp!(n%) > tc# THEN tc# = T#(n%): RC! = rot!
    IF rot! > Rmax! OR n% = 1 THEN
        DO UNTIL Rmax! > rot!
            Rmax! = 2 * Rmax!
        LOOP
    LOCATE 3, 32 : PRINT USING "####.#"; Rmax!
    LOCATE 6, 32 : PRINT USING "####.#"; .75 * Rmax!
    LOCATE 9, 32 : PRINT USING "####.#"; .5 * Rmax!
    LOCATE 12, 32 : PRINT USING "####.#"; .25 * Rmax!
    WINDOW (0, 0)-(300, Rmax!)
```

VIEW (299, 35)-(634, 205), 0, 7

Ymin! = 0

Ymax! = Rmax!

Gridx% = 10

Gridy% = Ymax! / 20

xinterval% = 50

DO

IF Gridx% MOD xinterval% = 0 THEN q! = .97 ELSE q! = .99

LINE (Gridx%, 0)-(Gridx%, Ymax! - Ymax! * q!), 15

IF q! = .97 THEN LINE (Gridx%, 0)-(Gridx%, Ymax!), 7, , &HAAAA

LINE (0, Gridy! * 5)-(300, Gridy! * 5), 7, , &H4924

Gridx% = Gridx% + (xinterval% / 5)

Gridy! = Gridy! + (Ymax! / 20)

LOOP UNTIL Gridx% >= 300

FOR j% = 1 TO n%

CIRCLE (T#(j%), p1!(j%)), 1, 15

CIRCLE (T#(j%), p2!(j%)), 2, 15

NEXT j%

ELSE

CIRCLE (T#(n%), p1!(n%)), 1, 15

CIRCLE (T#(n%), p2!(n%)), 2, 15

END IF

END SUB

SUB ReadDmm

address% = 16

Nad\$ = SPACE\$(80)

enter Nad\$, length1%, address%, status%

```
    IF status% <> 0 THEN STOP  
END SUB
```

```
SUB ReadTempC  
    address% = 12  
    r2$ = SPACE$(90)  
    enter r2$, length1%, address%, status%  
    IF status% <> 0 THEN STOP
```

```
END SUB
```

```
SUB Sein  
    SELECT CASE Oop$  
        CASE "1"  
            in  
        CASE "2"  
            inll  
    END SELECT  
END SUB
```

```
SUB SetDmm (cmd$)  
    address% = 16  
    send address%, cmd$, status%  
    IF status% <> 0 THEN STOP  
END SUB
```

```
SUB SetScan (cmd$)  
    address% = 17
```

```
    send address%, cmd$, status%  
    IF status% <> 0 THEN STOP  
END SUB
```

```
SUB SetTempCout (cmd$)  
    address% = 12  
    send address%, cmd$, status%  
    IF status% <> 0 THEN STOP  
END SUB
```

```
SUB sHead  
    SELECT CASE Oop$  
        CASE "1"  
            Head  
        CASE "2"  
            HeadII  
    END SELECT  
END SUB
```

```
SUB SLenght  
CLS  
    SELECT CASE Oop$  
        CASE "1"  
            Lenght  
        CASE "2"  
            LengthII  
    END SELECT  
END SUB
```

SUB SMeasn

 SELECT CASE Oop\$

 CASE "1"

 Meas

 CASE "2"

 MeasII

END SELECT

END SUB

SUB Test

 FOR i = 1 TO 25

 ReadTempC

 Temp!(n%) = VAL((MID\$(r2\$, 1)))

 LOCATE 21, 36

 PRINT USING "###.##"; Temp!(n%)

 T#(n%) = VAL((MID\$(r2\$, 10, 16)))

 T! = Temp!(n%)

 dt! = T#(n%) - T!

 IF dt! < 0 THEN cmd\$ = "S" + STR\$(T! + .5) ELSE cmd\$ = "S" + STR\$(T! - .3)

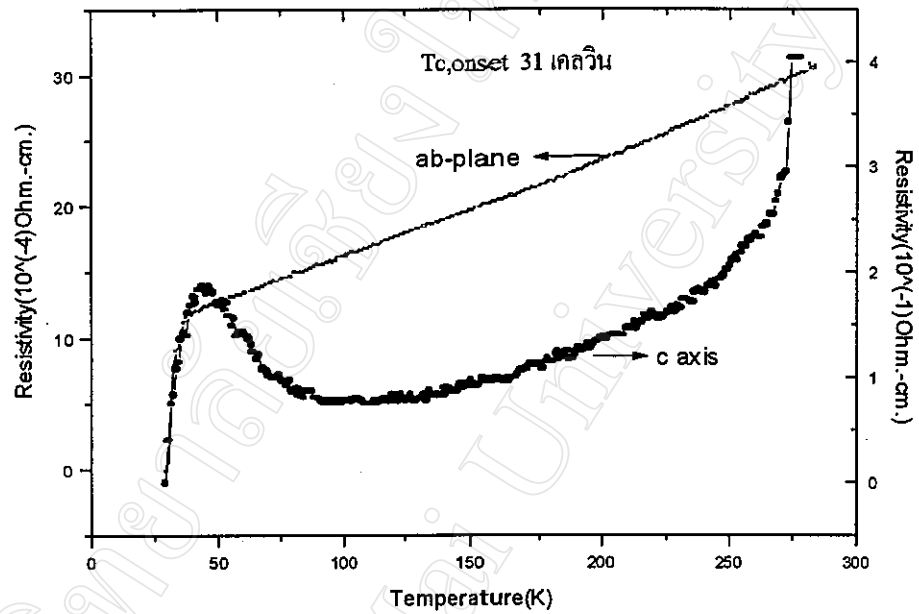
 SetTempCout cmd\$

 NEXT

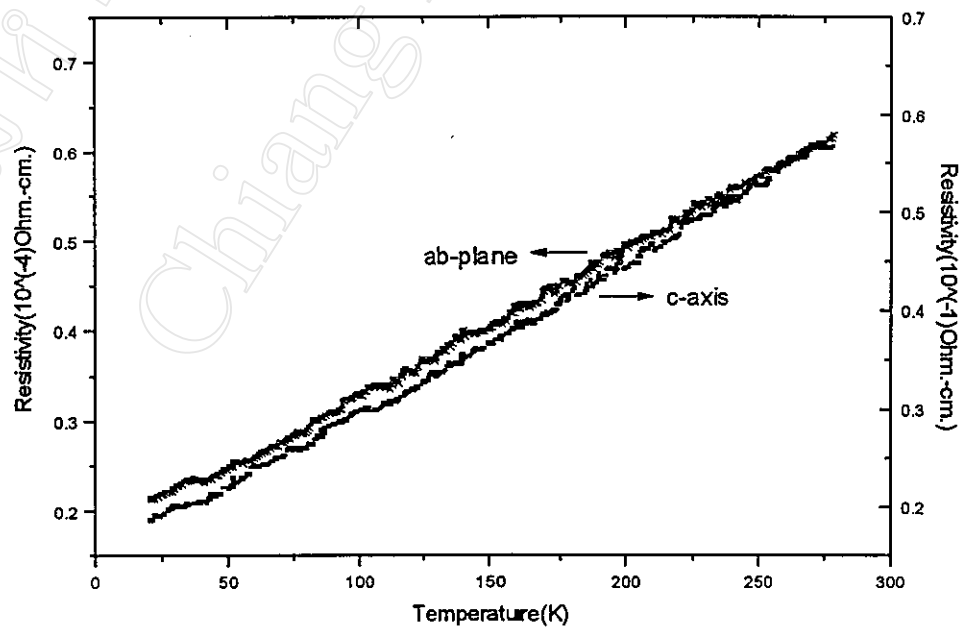
END SUB

ภาคผนวก ข

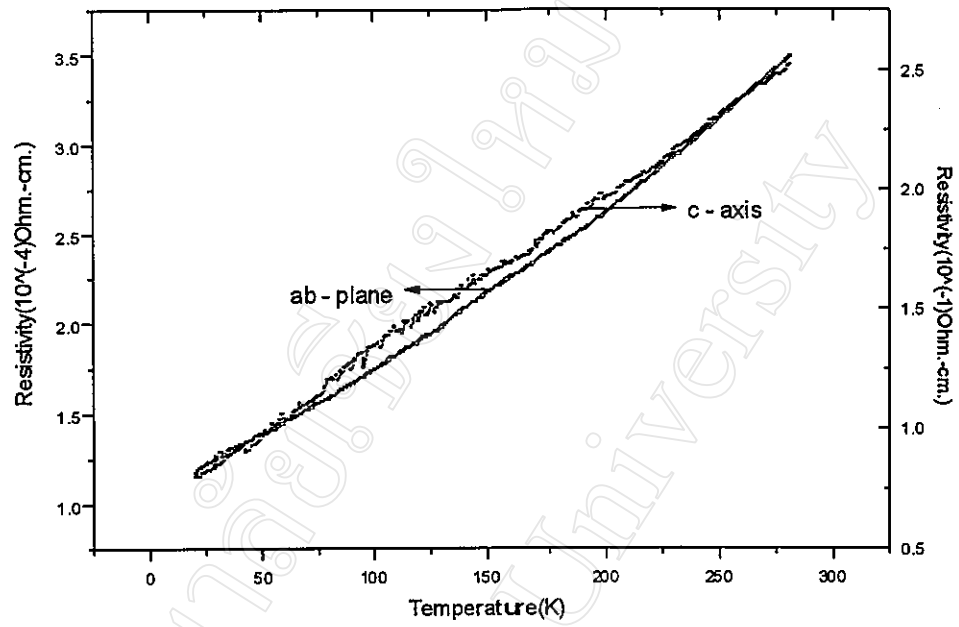
รูปที่ 1-3 แสดงกราฟเปรียบเทียบค่าสภาพต้านทานในระนาบ Cu-O, ρ_{ab} และค่าสภาพต้านทานที่ตั้งฉากกับระนาบ Cu-O, ρ_c



รูปที่ 1 แสดงกราฟเปรียบเทียบค่าสภาพต้านทาน ρ_{ab} และ ρ_c ที่การได้ป $x = 0.2$



รูปที่ 2 แสดงกราฟเปรียบเทียบค่าสภาพต้านทาน ρ_{ab} และ ρ_c ที่การได้ป $x = 0.3$



รูปที่ 3 แสดงกราฟเปรียบเทียบค่าสภาพต้านทาน ρ_{ab} และ ρ_c ที่การโด๊ป $x = 0.35$

ภาคผนวก ค

ตารางที่ ผ.1 แสดงผลค่าสภาพความต้านทาน ρ_{ab} ของผลึกเชิงเดี่ยว $\text{La}_{2-x}\text{Sr}_x\text{CuO}_4$ ที่การ

ได้ $x=0.2$

No	T (K)	ρ ($10^{-4}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-4}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-4}\Omega\text{-cm.}$)
1	29.4	-0.09064	27	55.46	13.04763	53	80.55	14.86949
2	30.43	0.23566	28	56.53	13.14733	54	81.569	14.91481
3	31.68	5.00786	29	57.56	13.21078	55	82.5	15.00545
4	32.53	7.91287	30	58.6	13.26516	56	83.52	14.98279
5	33.65	8.97789	31	59.48	13.27423	57	84.54	14.96013
6	34.64	9.50814	32	60.59	13.47817	58	85.569	15.10969
7	35.5	10.36922	33	61.55	13.49176	59	86.56	15.26831
8	36.46	11.06714	34	62.63	13.4963	60	87.56	15.26378
9	37.59	11.54754	35	63.55	13.53255	61	88.56	15.4088
10	38.44	11.70616	36	63.55	13.53255	62	89.56	15.49038
11	39.45	11.81492	37	64.58	13.63226	63	90.56	15.46772
12	40.6	11.95088	38	65.52	13.71836	64	91.53	15.51757
13	41.51	12.04152	39	66.52	13.77275	65	92.53	15.61274
14	42.6	12.10044	40	67.53	13.87698	66	93.5	15.64446
15	43.51	12.20921	41	68.52	13.92684	67	94.64	15.83481
16	44.48	12.29078	42	69.48	13.97216	68	95.459	15.7623
17	45.62	12.37689	43	70.59	14.15797	69	96.68	15.8484
18	46.61	12.4494	44	71.53	14.22142	70	97.37	15.97077
19	47.56	12.54911	45	72.49	14.2758	71	98.41	16.07954
20	48.5	12.58083	46	73.52	14.25767	72	99.48	16.14298
21	49.58	12.5763	47	74.56	14.40723	73	100.72	16.12486
22	50.52	12.676	48	75.47	14.49787	74	101.57	16.24269
23	51.5	12.78477	49	76.53	14.56132	75	102.57	16.41944
24	52.59	12.79837	50	77.55	14.55678	76	103.53	16.49195
25	53.49	12.95699	51	78.599	14.71087	77	104.5	16.44663
26	54.59	13.07029	52	79.53	14.69728	78	105.5	16.52367

No	T (K)	ρ ($10^{-4}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-4}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-4}\Omega\text{-cm.}$)
79	106.57	16.60072	108	135.65	18.61746	137	163.52	20.65686
80	107.5	16.67323	109	136.51	18.63558	138	164.48	20.7203
81	108.55	16.73214	110	137.66	18.73076	139	165.62	20.74296
82	109.46	16.80919	111	138.53	18.75342	140	166.5	20.85626
83	110.5	16.90436	112	139.66	18.87578	141	167.59	20.86533
84	111.57	16.95874	113	140.48	18.88938	142	168.46	21.05114
85	112.57	17.0086	114	140.48	18.88938	143	169.54	21.11006
86	113.5	17.08564	115	141.57	19.01627	144	170.65	21.11459
87	114.57	17.12643	116	142.67	19.09785	145	171.49	21.14631
88	115.55	17.24879	117	143.43	19.17036	146	172.56	21.27321
89	116.53	17.29411	118	144.5	19.25194	147	173.41	21.31853
90	117.51	17.37116	119	145.56	19.31085	148	174.67	21.40464
91	118.53	17.41648	120	146.65	19.40602	149	175.5	21.53606
92	119.57	17.50712	121	147.62	19.46041	150	176.54	21.55872
93	120.56	17.5751	122	148.65	19.51932	151	177.57	21.60858
94	121.53	17.63854	123	149.69	19.64169	152	178.4	21.7536
95	122.51	17.73825	124	150.45	19.68701	153	179.64	21.85784
96	123.5	17.79263	125	151.44	19.72326	154	180.67	21.8533
97	124.54	17.88327	126	152.46	19.8139	155	181.68	21.89862
98	125.54	17.96032	127	153.45	19.88188	156	182.46	22.06631
99	126.58	18.01923	128	154.42	20.00878	157	183.49	22.03912
100	127.56	18.07815	129	155.43	20.04957	158	184.67	22.15242
101	128.54	18.16879	130	156.65	20.14474	159	185.68	22.23852
102	129.56	18.23224	131	157.6	20.21725	160	186.66	22.31104
103	130.52	18.27302	132	158.57	20.29883	161	187.63	22.46512
104	131.5	18.36366	133	159.52	20.35774	162	188.6	22.51951
105	132.55	18.4543	134	160.49	20.42572	163	189.58	22.56483
106	133.59	18.53135	135	161.69	20.49824	164	190.53	22.69626
107	134.59	18.53135	136	162.6	20.54356	165	191.66	22.7597

No	T (K)	ρ ($10^{-4}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-4}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-4}\Omega\text{-cm.}$)
166	192.6	22.83675	195	221.6	25.17979	224	250.42	27.6452
167	193.55	22.96818	196	222.51	25.27043	225	251.58	27.74943
168	194.62	23.05428	197	223.57	25.35201	226	252.54	27.90806
169	195.49	23.1132	198	224.63	25.40639	227	253.51	27.86727
170	196.54	23.14946	199	225.54	25.47437	228	254.59	27.92618
171	197.52	23.24463	200	226.6	25.66018	229	255.51	28.06668
172	198.62	23.34433	201	227.63	25.7055	230	256.55	28.17091
173	199.53	23.50295	202	228.51	25.82334	231	257.6	28.22076
174	200.59	23.53468	203	229.54	25.88678	232	258.52	28.43377
175	201.46	23.60719	204	230.55	25.92757	233	259.54	28.45643
176	202.5	23.64797	205	231.53	26.06353	234	260.54	28.45643
177	203.53	23.71596	206	232.51	26.14511	235	261.57	28.61051
178	204.57	23.83379	207	233.63	26.16777	236	262.57	28.71022
179	205.57	23.88817	208	234.59	26.34452	237	263.55	28.81446
180	206.57	23.96522	209	235.54	26.35811	238	264.55	28.96854
181	207.58	23.94709	210	236.51	26.47141	239	265.52	28.8915
182	208.57	24.11477	211	237.58	26.50314	240	266.58	29.08184
183	209.57	24.20541	212	238.51	26.67082	241	267.54	29.09091
184	210.55	24.31418	213	239.57	26.69348	242	268.51	29.24499
185	211.52	24.32324	214	240.63	26.79772	243	269.55	29.31751
186	212.64	24.38669	215	241.56	26.86116	244	270.57	29.49879
187	213.59	24.47733	216	242.6	27.02885	245	271.51	29.43987
188	214.55	24.54531	217	243.5	27.11042	246	272.55	29.60755
189	215.63	24.713	218	244.52	27.11042	247	273.56	29.66647
190	216.58	24.77644	219	245.54	27.18294	248	274.54	29.81603
191	217.66	24.7991	220	246.55	27.2917	249	275.54	29.82056
192	218.57	24.88974	221	247.57	27.3189	250	276.5	29.97012
193	219.49	24.92147	222	248.57	27.52283	251	277.57	29.97918
194	220.56	25.05743	223	249.56	27.52737	252	278.53	30.10154

ตารางที่ ผ.2 แสดงผลค่าสภาพความต้านทาน ρ_c ของผลึกเชิงเดี่ยว $\text{La}_{2-x}\text{Sr}_x\text{CuO}_4$ ที่การ
ได้ $x=0.2$

No	T (K)	ρ ($10^{-1}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-1}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-1}\Omega\text{-cm.}$)
1	29.4	-0.00967	27	55.46	1.48975	53	80.55	0.86902
2	30.43	0.40347	28	56.53	1.55183	54	81.569	0.90006
3	31.68	0.74488	29	57.56	1.39664	55	82.5	0.83799
4	32.53	0.83799	30	58.6	1.42768	56	83.52	0.86902
5	33.65	1.08628	31	59.48	1.42768	57	84.54	0.80695
6	34.64	1.14835	32	60.59	1.42768	58	85.569	0.86902
7	35.5	1.36561	33	61.55	1.39664	59	86.56	0.86902
8	36.46	1.42768	34	62.63	1.36561	60	87.56	0.86902
9	37.59	1.39664	35	63.55	1.30353	61	88.56	0.80695
10	38.44	1.6139	36	63.55	1.24146	62	89.56	0.80695
11	39.45	1.67597	37	64.58	1.24146	63	90.56	0.77591
12	40.6	1.76908	38	65.52	1.17939	64	91.53	0.77591
13	41.51	1.70701	39	66.52	1.21042	65	92.53	0.74488
14	42.6	1.83115	40	67.53	1.08628	66	93.5	0.77591
15	43.51	1.86219	41	68.52	1.08628	67	94.64	0.74488
16	44.48	1.86219	42	69.48	1.05524	68	95.459	0.77591
17	45.62	1.80012	43	70.59	1.0242	69	96.68	0.74488
18	46.61	1.86219	44	71.53	0.99317	70	97.37	0.77591
19	47.56	1.83115	45	72.49	0.99317	71	98.41	0.74488
20	48.5	1.80012	46	73.52	0.99317	72	99.48	0.74488
21	49.58	1.70701	47	74.56	1.0242	73	100.72	0.77591
22	50.52	1.67597	48	75.47	0.96213	74	101.57	0.77591
23	51.5	1.73804	49	76.53	0.96213	75	102.57	0.77591
24	52.59	1.64493	50	77.55	0.9311	76	103.53	0.77591
25	53.49	1.70701	51	78.599	0.96213	77	104.5	0.80695
26	54.59	1.58286	52	79.53	0.86902	78	105.5	0.80695

No	T (K)	ρ ($10^{-1}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-1}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-1}\Omega\text{-cm.}$)
79	106.57	0.77591	108	135.65	0.83799	137	163.52	0.96213
80	107.5	0.77591	109	136.51	0.83799	138	164.48	0.99317
81	108.55	0.74488	110	137.66	0.83799	139	165.62	0.99317
82	109.46	0.74488	111	138.53	0.83799	140	166.5	1.0242
83	110.5	0.74488	112	139.66	0.83799	141	167.59	1.05524
84	111.57	0.74488	113	140.48	0.83799	142	168.46	1.05524
85	112.57	0.77591	114	140.48	0.90006	143	169.54	1.08628
86	113.5	0.74488	115	141.57	0.90006	144	170.65	1.08628
87	114.57	0.77591	116	142.67	0.90006	145	171.49	1.11731
88	115.55	0.77591	117	143.43	0.86902	146	172.56	1.11731
89	116.53	0.80695	118	144.5	0.86902	147	173.41	1.11731
90	117.51	0.77591	119	145.56	0.86902	148	174.67	1.11731
91	118.53	0.77591	120	146.65	0.9311	149	175.5	1.11731
92	119.57	0.83799	121	147.62	0.90006	150	176.54	1.08628
93	120.56	0.83799	122	148.65	0.9311	151	177.57	1.14835
94	121.53	0.77591	123	149.69	0.9311	152	178.4	1.17939
95	122.51	0.77591	124	150.45	0.96213	153	179.64	1.14835
96	123.5	0.83799	125	151.44	0.9311	154	180.67	1.14835
97	124.54	0.80695	126	152.46	0.9311	155	181.68	1.21042
98	125.54	0.77591	127	153.45	0.9311	156	182.46	1.24146
99	126.58	0.80695	128	154.42	0.99317	157	183.49	1.17939
100	127.56	0.83799	129	155.43	0.99317	158	184.67	1.21042
101	128.54	0.77591	130	156.65	0.96213	159	185.68	1.24146
102	129.56	0.77591	131	157.6	0.96213	160	186.66	1.17939
103	130.52	0.80695	132	158.57	0.99317	161	187.63	1.24146
104	131.5	0.80695	133	159.52	0.99317	162	188.6	1.17939
105	132.55	0.83799	134	160.49	0.96213	163	189.58	1.21042
106	133.59	0.77591	135	161.69	0.96213	164	190.53	1.2725
107	134.59	0.86902	136	162.6	0.99317	165	191.66	1.2725

No	T (K)	ρ ($10^{-1}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-1}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-1}\Omega\text{-cm.}$)
166	192.6	1.24146	195	221.6	1.55183	224	250.42	2.04841
167	193.55	1.2725	196	222.51	1.58286	225	251.58	2.11048
168	194.62	1.30353	197	223.57	1.55183	226	252.54	2.14152
169	195.49	1.2725	198	224.63	1.58286	227	253.51	2.11048
170	196.54	1.30353	199	225.54	1.6139	228	254.59	2.17256
171	197.52	1.33457	200	226.6	1.6139	229	255.51	2.23463
172	198.62	1.33457	201	227.63	1.64493	230	256.55	2.23463
173	199.53	1.36561	202	228.51	1.6139	231	257.6	2.2967
174	200.59	1.36561	203	229.54	1.67597	232	258.52	2.2967
175	201.46	1.36561	204	230.55	1.64493	233	259.54	2.32774
176	202.5	1.36561	205	231.53	1.73804	234	260.54	2.35877
177	203.53	1.39664	206	232.51	1.73804	235	261.57	2.32774
178	204.57	1.39664	207	233.63	1.73804	236	262.57	2.32774
179	205.57	1.39664	208	234.59	1.70701	237	263.55	2.42085
180	206.57	1.39664	209	235.54	1.70701	238	264.55	2.45188
181	207.58	1.39664	210	236.51	1.80012	239	265.52	2.45188
182	208.57	1.39664	211	237.58	1.83115	240	266.58	2.54499
183	209.57	1.45872	212	238.51	1.83115	241	267.54	2.54499
184	210.55	1.45872	213	239.57	1.80012	242	268.51	2.66914
185	211.52	1.45872	214	240.63	1.80012	243	269.55	2.73121
186	212.64	1.52079	215	241.56	1.86219	244	270.57	2.88639
187	213.59	1.45872	216	242.6	1.86219	245	271.51	2.91743
188	214.55	1.48975	217	243.5	1.89323	246	272.55	2.94847
189	215.63	1.52079	218	244.52	1.86219	247	273.56	3.41402
190	216.58	1.58286	219	245.54	1.92426	248	274.54	4.03475
191	217.66	1.55183	220	246.55	1.92426	249	275.54	4.03475
192	218.57	1.55183	221	247.57	1.9553	250	276.5	4.03475
193	219.49	1.6139	222	248.57	2.01737	251	277.57	4.03475
194	220.56	1.58286	223	249.56	2.01737	252	278.53	4.03478

ตารางที่ ผ.3 แสดงผลค่าสภาพความต้านทาน ρ_{ab} ของผลึกเชิงเดี่ยว $\text{La}_{2-x}\text{Sr}_x\text{CuO}_4$ ที่การได้ไป

$x = 0.3$

No	T (K)	ρ ($10^{-4}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-4}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-4}\Omega\text{-cm.}$)
1	21.2	0.21326	27	46.07	0.239592	53	73.84	0.28011
2	22.11	0.21281	28	47.28	0.242762	54	74.75	0.283506
3	23.41	0.21542	29	48.42	0.246158	55	75.69	0.284355
4	24.68	0.217722	30	49.64	0.245529	56	76.65	0.28775
5	25.42	0.218438	31	50.8	0.248704	57	77.58	0.285628
6	26.32	0.219945	32	52.12	0.254646	58	78.46	0.285628
7	27.55	0.22099	33	53.29	0.253762	59	79.36	0.287325
8	28.75	0.221268	34	54.43	0.254646	60	80.23	0.289872
9	29.45	0.224601	35	55.59	0.25271	61	81.08	0.292843
10	30.61	0.22784	36	56.68	0.256186	62	82.01	0.299633
11	31.38	0.228001	37	57.77	0.256529	63	82.87	0.300558
12	32.61	0.229513	38	58.86	0.255256	64	83.73	0.300939
13	33.55	0.232122	39	59.89	0.258651	65	84.63	0.300907
14	34.6	0.233025	40	60.91	0.260349	66	85.52	0.303453
15	35.49	0.234125	41	61.99	0.262896	67	86.38	0.303453
16	36.68	0.235044	42	62.98	0.264407	68	87.26	0.305575
17	37.54	0.23517	43	63.91	0.265681	69	88.14	0.306848
18	38.12	0.23354	44	64.92	0.266529	70	88.97	0.308122
19	39.45	0.234699	45	65.91	0.2695	71	89.91	0.30897
20	40.98	0.23157	46	66.89	0.272047	72	90.76	0.309395
21	41	0.233425	47	67.91	0.272047	73	91.6	0.310668
22	41.75	0.23521	48	68.94	0.272047	74	92.5	0.312366
23	42.23	0.234699	49	69.92	0.275866	75	93.37	0.31279
24	43.43	0.235123	50	70.96	0.276291	76	94.22	0.321278
25	44.79	0.238943	51	71.87	0.277564	77	95.13	0.323825
26	45.3	0.239003	52	72.81	0.28011	78	95.92	0.321703

No	T (K)	ρ ($10^{-4}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-4}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-4}\Omega\text{-cm.}$)
79	96.75	0.323825	108	120.64	0.352685	137	141.92	0.399798
80	97.64	0.325522	109	121.49	0.354112	138	142.71	0.395554
81	98.44	0.328069	110	122.26	0.352685	139	143.53	0.397125
82	99.23	0.329342	111	123.04	0.359533	140	144.3	0.395282
83	100.1	0.326796	112	123.88	0.359577	141	145.1	0.396585
84	100.92	0.327644	113	124.69	0.368065	142	145.93	0.398869
85	101.75	0.332737	114	125.47	0.365748	143	146.71	0.398521
86	102.59	0.332552	115	126.2	0.359023	144	147.48	0.398945
87	103.41	0.337486	116	126.31	0.365608	145	148.32	0.398945
88	104.24	0.337081	117	127.09	0.365566	146	149.09	0.400643
89	105.1	0.33783	118	127.9	0.367774	147	149.92	0.401067
90	105.91	0.33783	119	128.75	0.367777	148	150.7	0.403189
91	106.73	0.338679	120	129.56	0.366266	149	151.48	0.40616
92	107.61	0.336981	121	130.35	0.368812	150	152.31	0.407433
93	108.42	0.337589	122	131.22	0.374861	151	153.1	0.408282
94	109.24	0.338359	123	132.06	0.379302	152	153.88	0.408707
95	110.08	0.338401	124	132.84	0.37884	153	154.73	0.40616
96	110.91	0.338443	125	133.05	0.378028	154	155.47	0.411678
97	111.73	0.335708	126	133.72	0.376579	155	156.26	0.409131
98	112.6	0.339103	127	134.53	0.383852	156	157.1	0.412526
99	113.39	0.346318	128	135.38	0.381597	157	157.91	0.418468
100	114.22	0.343772	129	136.01	0.386582	158	158.69	0.418044
101	115.1	0.34165	130	136.25	0.38555	159	159.54	0.425683
102	115.87	0.344196	131	137.11	0.390963	160	160.33	0.422712
103	116.68	0.348865	132	137.92	0.39231	161	161.13	0.427381
104	117.44	0.353533	133	138.74	0.393058	162	162	0.42441
105	118.23	0.35608	134	139.55	0.389184	163	162.8	0.428654
106	119.02	0.354807	135	140.31	0.39937	164	163.61	0.424834
107	119.83	0.356929	136	141.16	0.392579	165	164.49	0.427805

No	T (K)	ρ ($10^{-4}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-4}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-4}\Omega\text{-cm.}$)
166	165.32	0.429503	195	188.42	0.473217	224	211.16	0.508867
167	166.16	0.429927	196	189.26	0.472792	225	211.95	0.506745
168	167.04	0.432474	197	190.05	0.475339	226	212.74	0.508443
169	167.89	0.432898	198	190.85	0.483403	227	213.59	0.506745
170	168.71	0.442235	199	191.68	0.482129	228	214.39	0.510141
171	169.5	0.444781	200	192.48	0.482554	229	215.24	0.510565
172	170.28	0.444781	201	193.35	0.481705	230	216.05	0.512263
173	171.11	0.446904	202	194.15	0.484676	231	216.83	0.510565
174	171.89	0.448601	203	194.96	0.479583	232	217.72	0.523722
175	172.68	0.440113	204	195.37	0.478561	233	218.49	0.5216
176	173.51	0.443508	205	195.79	0.480432	234	219.32	0.523297
177	174.29	0.448177	206	196.57	0.487901	235	220.22	0.519053
178	175.05	0.446055	207	197.38	0.487037	236	221.03	0.519902
179	175.88	0.453694	208	198.21	0.477885	237	221.81	0.520751
180	176.65	0.454118	209	199	0.494437	238	222.64	0.529239
181	177.47	0.450723	210	199.78	0.494437	239	223.49	0.526268
182	178.28	0.451572	211	200.63	0.491891	240	224.34	0.52839
183	179.04	0.452421	212	201.4	0.494862	241	225.13	0.533059
184	179.86	0.451148	213	202.19	0.497408	242	225.97	0.540274
185	180.69	0.45327	214	203.03	0.494437	243	226.84	0.53603
186	181.47	0.458787	215	203.82	0.496984	244	227.65	0.539425
187	182.3	0.459636	216	204.67	0.499955	245	228.43	0.53603
188	183.09	0.46388	217	205.47	0.498257	246	229.3	0.541122
189	183.85	0.460485	218	206.26	0.500379	247	230.12	0.546215
190	184.63	0.462607	219	207.11	0.502501	248	230.89	0.545791
191	185.4	0.464729	220	207.9	0.49953	249	231.84	0.538576
192	186.12	0.472368	221	208.67	0.503774	250	232.59	0.544518
193	186.85	0.474915	222	209.53	0.503774	251	233.52	0.541547
194	187.63	0.4677	223	210.32	0.507594	252	234.31	0.547913

No	T (K)	ρ ($10^{-4}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-4}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-4}\Omega\text{-cm.}$)
253	235.04	0.550459	282	258.56	0.584837	311	282.92	0.620487
254	235.87	0.543245	283	259.39	0.585261	312	283.77	0.622185
255	236.72	0.547489	284	260.2	0.586534	313	284.72	0.623882
256	237.53	0.546215	285	261.05	0.588656	314	285.61	0.623034
257	238.38	0.547913	286	261.84	0.589505	315	286.58	0.624731
258	239.16	0.555552	287	262.65	0.592052	316	287.51	0.62558
259	239.96	0.558099	288	263.53	0.592052	317	288.44	0.626429
260	240.84	0.558523	289	264.32	0.592052	318	289.49	0.624731
261	241.63	0.559372	290	265.15	0.594598	319	290.53	0.625156
262	242.5	0.559796	291	265.98	0.59672	320	291.61	0.62558
263	243.27	0.558523	292	266.81	0.598842	321	292.88	0.626429
264	244.06	0.562767	293	267.66	0.600115	322	294.17	0.62558
265	244.83	0.564041	294	268.49	0.601389	323	295.75	0.625156
266	245.62	0.563192	295	269.32	0.602237	324	296.91	0.624731
267	246.45	0.564465	296	270.2	0.606057	325	296.99	0.624731
268	247.28	0.566587	297	270.99	0.603935	326	296.99	0.62558
269	248.05	0.566587	298	271.82	0.605208	327	296.99	0.625156
270	248.84	0.568285	299	272.69	0.606482	328	296.99	0.624307
271	249.69	0.571256	300	273.52	0.608604	329	297	0.626853
272	250.5	0.571256	301	274.37	0.608179			
273	251.33	0.572104	302	275.25	0.609028			
274	252.1	0.572953	303	276.06	0.612423			
275	252.93	0.575924	304	276.93	0.613697			
276	253.74	0.578471	305	277.76	0.614121			
277	254.49	0.579319	306	278.59	0.617941			
278	255.36	0.579744	307	279.51	0.617516			
279	256.13	0.581017	308	280.34	0.619214			
280	256.94	0.581441	309	281.13	0.620063			
281	257.75	0.583988	310	282.04	0.620063			

ตารางที่ ผ.4 แสดงผลค่าสภาพความต้านทาน ρ_c ของผลึกเชิงเดี่ยว $\text{La}_{2-x}\text{Sr}_x\text{CuO}_4$ ที่การได้ป

$x = 0.3$

No	T (K)	ρ ($10^{-1}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-1}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-1}\Omega\text{-cm.}$)
1	20.19	0.19742	27	46.31	0.211942	53	69.19	0.250118
2	21.33	0.196257	28	47.02	0.212226	54	70.22	0.251411
3	22.36	0.19753	29	48.21	0.219688	55	71.13	0.252274
4	23.81	0.19523	30	49.53	0.219258	56	72.02	0.259605
5	24.11	0.19622	31	50.62	0.218637	57	72.98	0.257018
6	25.41	0.197556	32	51.71	0.220079	58	73.89	0.258614
7	26.38	0.19846	33	52.31	0.229001	59	74.81	0.256586
8	27.52	0.19781	34	53	0.223812	60	75.72	0.260036
9	28.45	0.199881	35	54.17	0.225335	61	76.63	0.259478
10	29.81	0.19967	36	55.28	0.228987	62	77.51	0.257449
11	30.28	0.201	37	56.35	0.229418	63	78.43	0.258743
12	31.21	0.201069	38	57.41	0.233307	64	79.27	0.259443
13	32.48	0.201351	39	57.9	0.237583	65	80.15	0.258743
14	33.75	0.202416	40	58.44	0.238575	66	80.99	0.263055
15	34.33	0.202562	41	58.71	0.239541	67	81.83	0.263917
16	35.11	0.202853	42	59.56	0.240618	68	82.71	0.263486
17	36.62	0.202993	43	60.51	0.241204	69	83.52	0.268661
18	37.15	0.203022	44	61.47	0.241429	70	84.42	0.27168
19	38.63	0.203211	45	62.56	0.241667	71	85.26	0.277286
20	39.64	0.203437	46	63.49	0.242268	72	86.07	0.272111
21	40.82	0.205188	47	64.48	0.242355	73	86.96	0.276076
22	41.13	0.20488	48	65.41	0.242787	74	87.79	0.280736
23	42.17	0.203624	49	65.82	0.24384	75	88.6	0.282029
24	43.48	0.211656	50	66.35	0.245677	76	89.47	0.282461
25	44.71	0.211721	51	67.36	0.248393	77	90.28	0.283754
26	45.83	0.210844	52	68.27	0.248393	78	91.11	0.284617

No	T (K)	ρ ($10^{-1}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-1}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-1}\Omega\text{-cm.}$)
79	92	0.283754	108	115.34	0.308766	137	137.77	0.34499
80	92.81	0.286342	109	116.1	0.308335	138	138.51	0.345852
81	93.62	0.285981	110	116.94	0.311353	139	139.32	0.345421
82	94.5	0.285909	111	117.72	0.311353	140	140.09	0.353615
83	95.28	0.288498	112	118.49	0.313941	141	140.79	0.35534
84	96.08	0.290654	113	119.34	0.316528	142	141.59	0.351596
85	96.92	0.291085	114	120.11	0.319116	143	142.34	0.352321
86	97.7	0.294104	115	120.87	0.317822	144	143.06	0.355138
87	98.5	0.295829	116	121.64	0.318685	145	143.86	0.353964
88	99.3	0.295398	117	122.38	0.319978	146	144.57	0.357074
89	100.08	0.295829	118	123.15	0.320841	147	145.31	0.359645
90	100.88	0.298416	119	123.94	0.322134	148	146.1	0.357496
91	101.71	0.298416	120	124.71	0.323428	149	146.84	0.358358
92	102.48	0.301004	121	125.46	0.326016	150	147.62	0.359652
93	103.26	0.297985	122	126.26	0.326016	151	148.36	0.360083
94	104.1	0.301004	123	127.03	0.331365	152	149.11	0.36224
95	104.88	0.299279	124	127.74	0.333778	153	149.89	0.364827
96	105.71	0.297123	125	128.56	0.334659	154	150.68	0.365258
97	106.5	0.297985	126	129.31	0.333839	155	151.44	0.364314
98	107.26	0.299279	127	130.05	0.33468	156	152.17	0.368277
99	108.11	0.299279	128	130.86	0.333347	157	152.93	0.368708
100	108.88	0.301435	129	131.59	0.335072	158	153.73	0.371727
101	109.66	0.304454	130	132.42	0.335934	159	154.48	0.370002
102	110.53	0.304372	131	133.16	0.337228	160	155.2	0.372589
103	111.3	0.307472	132	133.91	0.337659	161	156.01	0.374314
104	112.15	0.301866	133	134.7	0.341971	162	156.77	0.376902
105	112.93	0.304022	134	135.46	0.34499	163	157.5	0.375177
106	113.73	0.305747	135	136.21	0.342403	164	158.24	0.377764
107	114.55	0.305747	136	137.02	0.343265	165	158.98	0.379489

No	T (K)	ρ ($10^{-1}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-1}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-1}\Omega\text{-cm.}$)
166	159.75	0.379489	195	181.84	0.413126	224	204.17	0.447625
167	160.53	0.385958	196	182.64	0.41485	225	205	0.455818
168	161.27	0.382076	197	183.42	0.415282	226	205.75	0.452799
169	162.04	0.384664	198	184.19	0.416144	227	206.5	0.458405
170	162.87	0.385958	199	185.02	0.420025	228	207.28	0.461855
171	163.59	0.388114	200	185.8	0.424338	229	208.03	0.46358
172	164.35	0.386389	201	186.61	0.42865	230	208.78	0.461677
173	165.13	0.386389	202	187.43	0.423044	231	209.55	0.465737
174	165.88	0.387251	203	188.18	0.425631	232	210.32	0.465112
175	166.6	0.388976	204	188.92	0.427788	233	211.07	0.459268
176	167.39	0.39027	205	189.75	0.426925	234	211.87	0.461855
177	168.13	0.392857	206	190.49	0.435119	235	212.62	0.462287
178	168.86	0.394582	207	191.24	0.429944	236	213.35	0.463149
179	169.64	0.39372	208	192.04	0.430375	237	214.18	0.468755
180	170.39	0.395445	209	192.81	0.433825	238	214.95	0.46703
181	171.19	0.396307	210	193.55	0.440293	239	215.71	0.467461
182	171.92	0.397601	211	194.35	0.441587	240	216.5	0.468755
183	172.68	0.398463	212	195.1	0.437706	241	217.27	0.47048
184	173.45	0.399326	213	195.84	0.435981	242	218.09	0.47393
185	174.19	0.403638	214	196.63	0.445037	243	218.83	0.471343
186	174.99	0.401913	215	197.36	0.4459	244	219.61	0.473499
187	175.72	0.413126	216	198.09	0.4459	245	220.42	0.475224
188	176.47	0.414419	217	198.9	0.448056	246	221.19	0.476517
189	177.25	0.407519	218	199.65	0.441587	247	221.97	0.482986
190	177.99	0.416144	219	200.42	0.442018	248	222.76	0.488161
191	178.78	0.415713	220	201.18	0.442881	249	223.55	0.48773
192	179.52	0.4183	221	201.91	0.4459	250	224.32	0.489886
193	180.29	0.420025	222	202.72	0.446331	251	225.14	0.489455
194	181.09	0.411832	223	203.44	0.447625	252	225.89	0.49118

No	T (K)	ρ ($10^{-1}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-1}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-1}\Omega\text{-cm.}$)
253	226.66	0.491334	282	249.34	0.526972	311	274.63	0.564921
254	227.49	0.491611	283	250.11	0.52611	312	275.5	0.566215
255	228.25	0.495061	284	250.88	0.530422	313	276.43	0.56449
256	229.02	0.495923	285	251.71	0.525679	314	277.33	0.565352
257	229.85	0.497648	286	252.5	0.526541	315	278.3	0.566646
258	230.62	0.496	287	253.31	0.528697	316	279.32	0.57139
259	231.38	0.496354	288	254.11	0.531285	317	280.28	0.569234
260	232.19	0.498079	289	254.9	0.536459	318	281.34	0.57139
261	232.94	0.501098	290	255.72	0.540772	319	282.62	0.572683
262	233.75	0.499818	291	256.5	0.539909	320	283.81	0.571821
263	234.5	0.503685	292	257.28	0.541634	321	285.12	0.57139
264	235.25	0.506273	293	258.14	0.54379	322	285.5	0.575702
265	236.08	0.50541	294	259.71	0.546809	323	285.54	0.575271
266	236.81	0.506273	295	260.54	0.547672	324	285.58	0.573546
267	237.58	0.504979	296	261.35	0.548965	325	285.59	0.573115
268	238.39	0.510154	297	262.12	0.549828	326	285.63	0.572683
269	239.15	0.50886	298	262.99	0.551122	327	285.65	0.571821
270	239.99	0.514466	299	263.78	0.553278			
271	240.73	0.511016	300	264.57	0.555003			
272	241.48	0.51576	301	265.44	0.555434			
273	242.29	0.510154	302	266.25	0.558021			
274	243.06	0.514898	303	267.06	0.554152			
275	243.83	0.521366	304	268.73	0.562765			
276	244.66	0.517916	305	269.6	0.563627			
277	245.41	0.51921	306	270.42	0.565352			
278	246.18	0.522229	307	271.22	0.565716			
279	246.99	0.525679	308	272.11	0.566646			
280	247.76	0.524816	309	272.94	0.568802			
281	248.53	0.528266	310	273.83	0.570096			

ตารางที่ ผ.5 แสดงผลค่าสภาพความต้านทาน ρ_{ab} ของผลึกเชิงเดี่ยว $\text{La}_{2-x}\text{Sr}_x\text{CuO}_4$ ที่การได้ไป $x=0.35$

No	T (K)	ρ ($10^{-4}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-4}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-4}\Omega\text{-cm.}$)
1	20.81	1.17881	27	47.64	1.36994	53	73.67	1.54052
2	21.45	1.18799	28	48.58	1.37641	54	74.61	1.54703
3	22.77	1.19687	29	49.51	1.38244	55	75.52	1.55253
4	23.71	1.2059	30	50.65	1.38765	56	76.63	1.56045
5	24.88	1.22097	31	51.52	1.39512	57	77.53	1.56537
6	25.92	1.22126	32	52.64	1.4012	58	78.53	1.57419
7	26.52	1.22956	33	53.52	1.40757	59	79.53	1.5795
8	27.72	1.23055	34	54.61	1.41355	60	80.52	1.58543
9	28.82	1.23922	35	55.64	1.42064	61	81.52	1.59436
10	29.67	1.24688	36	56.68	1.42421	62	82.64	1.59913
11	30.11	1.2633	37	57.69	1.43092	63	83.61	1.60898
12	31.79	1.2833	38	58.5	1.4384	64	84.59	1.61997
13	32.53	1.26452	39	59.5	1.44568	65	85.59	1.62663
14	33.13	1.27698	40	60.64	1.45031	66	86.54	1.63319
15	34.87	1.2988	41	61.55	1.4575	67	87.51	1.64009
16	35.98	1.30999	42	62.66	1.46628	68	88.58	1.64882
17	37.62	1.31116	43	63.55	1.474	69	89.53	1.6549
18	38.84	1.31799	44	64.6	1.47911	70	90.6	1.6644
19	39.45	1.32083	45	65.64	1.48577	71	91.56	1.66783
20	40.65	1.32604	46	66.67	1.49329	72	92.5	1.67936
21	41.53	1.33227	47	67.51	1.49971	73	93.55	1.68322
22	42.63	1.33849	48	68.52	1.50719	74	94.59	1.69277
23	43.43	1.34462	49	69.68	1.51384	75	95.5	1.7001
24	44.48	1.35065	50	70.64	1.51992	76	96.5	1.70507
25	45.47	1.35701	51	71.63	1.52687	77	97.5	1.71486
26	46.45	1.36314	52	72.56	1.53222	78	98.61	1.72389

No	T (K)	ρ ($10^{-4}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-4}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-4}\Omega\text{-cm.}$)
79	99.59	1.73189	108	128.52	1.95805	137	157.56	2.22745
80	100.57	1.73672	109	129.54	1.96683	138	158.57	2.23654
81	101.55	1.74391	110	130.59	1.97638	139	159.52	2.24564
82	102.53	1.75399	111	131.5	1.98554	140	160.53	2.25992
83	103.61	1.76098	112	132.52	1.99524	141	161.63	2.27056
84	104.57	1.76967	113	133.55	2.00542	142	162.55	2.27702
85	105.53	1.77984	114	134.53	2.01849	143	163.57	2.28202
86	106.6	1.78911	115	135.53	2.02828	144	164.54	2.29112
87	107.55	1.79755	116	136.53	2.04059	145	165.54	2.30767
88	108.48	1.80372	117	137.51	2.0524	146	166.5	2.31431
89	109.6	1.8126	118	138.51	2.06471	147	167.57	2.32231
90	110.53	1.81858	119	139.58	2.07228	148	168.51	2.33305
91	111.57	1.82939	120	140.54	2.08067	149	169.52	2.34187
92	112.5	1.83667	121	141.57	2.08752	150	170.53	2.35269
93	113.55	1.84092	122	142.5	2.0963	151	171.53	2.36242
94	114.57	1.84955	123	143.53	2.10084	152	172.52	2.36888
95	115.57	1.85906	124	144.57	2.11295	153	173.52	2.37707
96	116.55	1.86533	125	145.56	2.11825	154	174.51	2.38407
97	117.53	1.87396	126	146.57	2.12896	155	175.56	2.39535
98	118.51	1.88274	127	147.56	2.13924	156	176.52	2.40654
99	119.57	1.89012	128	148.57	2.14985	157	177.57	2.41599
100	120.53	1.89794	129	149.54	2.15921	158	178.54	2.4241
101	121.51	1.90923	130	150.54	2.16746	159	179.56	2.4255
102	122.56	1.91641	131	151.59	2.17523	160	180.57	2.43283
103	123.5	1.91989	132	152.58	2.18425	161	181.57	2.44566
104	124.56	1.92814	133	153.53	2.19107	162	182.5	2.46236
105	125.52	1.93301	134	154.5	2.20016	163	183.51	2.46424
106	126.54	1.94145	135	155.55	2.20926	164	184.55	2.47142
107	127.58	1.94985	136	156.5	2.21835	165	185.54	2.48054

No	T (K)	ρ ($10^{-4}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-4}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-4}\Omega\text{-cm.}$)
166	186.52	2.4831	195	215.5	2.7693	224	244.52	3.07418
167	187.51	2.49314	196	216.5	2.7795	225	245.53	3.08492
168	188.54	2.50205	197	217.54	2.78952	226	246.57	3.09579
169	189.57	2.51194	198	218.55	2.79987	227	247.53	3.10668
170	190.51	2.52176	199	219.53	2.81034	228	248.53	3.11748
171	191.54	2.53111	200	220.5	2.82073	229	249.56	3.12853
172	192.54	2.54078	201	221.54	2.83105	230	250.58	3.13937
173	193.57	2.55057	202	222.51	2.84118	231	251.48	3.15057
174	194.58	2.56028	203	223.53	2.85143	232	252.54	3.16169
175	195.51	2.57002	204	224.53	2.8616	233	253.58	3.17227
176	196.55	2.57958	205	225.54	2.87232	234	254.51	3.18354
177	197.52	2.58946	206	226.54	2.88253	235	255.55	3.1946
178	198.52	2.59906	207	227.55	2.89308	236	256.59	3.20558
179	199.55	2.60918	208	228.53	2.90355	237	257.5	3.2167
180	200.55	2.61903	209	229.57	2.91394	238	258.54	3.22783
181	201.52	2.6288	210	230.53	2.92456	239	259.56	3.23921
182	202.5	2.63869	211	231.51	2.93509	240	260.56	3.25028
183	203.54	2.6488	212	232.55	2.94565	241	261.55	3.26126
184	204.51	2.65844	213	233.52	2.95633	242	262.53	3.27271
185	205.53	2.6683	214	234.56	2.96694	243	263.49	3.28395
186	206.54	2.67828	215	235.5	2.97735	244	264.55	3.29534
187	207.52	2.68908	216	236.51	2.98789	245	265.59	3.30685
188	208.53	2.6987	217	237.53	2.99877	246	266.5	3.31794
189	209.55	2.70845	218	238.51	3.00967	247	267.5	3.32928
190	210.51	2.71852	219	239.51	3.02039	248	268.58	3.34097
191	211.54	2.72871	220	240.53	3.03102	249	269.53	3.3519
192	212.54	2.73862	221	241.57	3.04177	250	270.55	3.36353
193	213.51	2.74886	222	242.57	3.05234	251	271.55	3.37518
194	214.55	2.75922	223	243.56	3.06314	252	272.52	3.38606

No	T (K)	ρ ($10^{-4}\Omega\text{-cm.}$)
253	273.56	3.39753
254	274.56	3.40925
255	275.52	3.42053
256	276.53	3.43241
257	277.51	3.44374
258	278.51	3.45555
259	279.53	3.46692
260	280.53	3.47878
261	281.57	3.49019

ตารางที่ ๘.6 แสดงผลค่าสภาพความต้านทาน ρ_c ของผลึกเชิงเดี่ยว $\text{La}_{2-x}\text{Sr}_x\text{CuO}_4$ ที่การได้ป

$x = 0.35$

No	T (K)	ρ ($10^{-1}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-1}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-1}\Omega\text{-cm.}$)
1	20.81	0.802	27	47.64	0.93353	53	73.67	1.11526
2	21.45	0.802	28	48.58	0.94692	54	74.61	1.12291
3	22.77	0.802	29	49.51	0.95457	55	75.52	1.13248
4	23.71	0.814	30	50.65	0.97179	56	76.63	1.13822
5	24.88	0.815	31	51.52	0.99666	57	77.53	1.14587
6	25.92	0.823	32	52.64	0.9737	58	78.53	1.16882
7	26.52	0.822	33	53.52	0.98327	59	79.53	1.20326
8	27.72	0.827	34	54.61	1.01579	60	80.52	1.20326
9	28.82	0.838	35	55.64	0.99666	61	81.52	1.209
10	29.67	0.841	36	56.68	0.99474	62	82.64	1.20326
11	30.11	0.847	37	57.69	1.0177	63	83.61	1.22239
12	31.79	0.85	38	58.5	1.03109	64	84.59	1.20134
13	32.53	0.858	39	59.5	1.05596	65	85.59	1.23769
14	33.13	0.869	40	60.64	1.02344	66	86.54	1.22621
15	34.87	0.882	41	61.55	1.03109	67	87.51	1.25108
16	35.98	0.895	42	62.66	1.03874	68	88.58	1.25873
17	37.62	0.901	43	63.55	1.04831	69	89.53	1.26639
18	38.84	0.90675	44	64.6	1.06744	70	90.6	1.2396
19	39.45	0.908	45	65.64	1.07509	71	91.56	1.27786
20	40.65	0.92014	46	66.67	1.10378	72	92.5	1.28552
21	41.53	0.92396	47	67.51	1.08274	73	93.55	1.29891
22	42.63	0.91249	48	68.52	1.09231	74	94.59	1.30847
23	43.43	0.90292	49	69.68	1.09231	75	95.5	1.25299
24	44.48	0.91057	50	70.64	1.09804	76	96.5	1.28743
25	45.47	0.92396	51	71.63	1.1057	77	97.5	1.31995
26	46.45	0.94883	52	72.56	1.10952	78	98.61	1.33143

No	T (K)	ρ ($10^{-1}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-1}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-1}\Omega\text{-cm.}$)
79	99.59	1.33525	108	128.52	1.49594	137	157.56	1.68915
80	100.57	1.3429	109	129.54	1.52846	138	158.57	1.6815
81	101.55	1.34482	110	130.59	1.51698	139	159.52	1.68341
82	102.53	1.35438	111	131.5	1.52846	140	160.53	1.69489
83	103.61	1.33525	112	132.52	1.52846	141	161.63	1.70446
84	104.57	1.36395	113	133.55	1.52655	142	162.55	1.70063
85	105.53	1.37351	114	134.53	1.52846	143	163.57	1.70828
86	106.6	1.38499	115	135.53	1.5342	144	164.54	1.71785
87	107.55	1.38882	116	136.53	1.5495	145	165.54	1.71976
88	108.48	1.39838	117	137.51	1.54377	146	166.5	1.71402
89	109.6	1.41751	118	138.51	1.57246	147	167.57	1.73506
90	110.53	1.40603	119	139.58	1.59542	148	168.51	1.74463
91	111.57	1.40603	120	140.54	1.57629	149	169.52	1.77906
92	112.5	1.40795	121	141.57	1.57246	150	170.53	1.75419
93	113.55	1.39455	122	142.5	1.61455	151	171.53	1.7848
94	114.57	1.44238	123	143.53	1.58776	152	172.52	1.78097
95	115.57	1.43664	124	144.57	1.62985	153	173.52	1.79628
96	116.55	1.44238	125	145.56	1.60307	154	174.51	1.80776
97	117.53	1.42134	126	146.57	1.60307	155	175.56	1.81732
98	118.51	1.45577	127	147.56	1.61263	156	176.52	1.81732
99	119.57	1.47107	128	148.57	1.63176	157	177.57	1.80967
100	120.53	1.44047	129	149.54	1.62985	158	178.54	1.81923
101	121.51	1.48446	130	150.54	1.63368	159	179.56	1.82497
102	122.56	1.48446	131	151.59	1.66237	160	180.57	1.83454
103	123.5	1.49785	132	152.58	1.64707	161	181.57	1.84793
104	124.56	1.46533	133	153.53	1.65663	162	182.5	1.85941
105	125.52	1.51316	134	154.5	1.65472	163	183.51	1.86323
106	126.54	1.51125	135	155.55	1.6662	164	184.55	1.86514
107	127.58	1.48446	136	156.5	1.6662	165	185.54	1.89384

No	T (K)	ρ ($10^{-1}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-1}\Omega\text{-cm.}$)	No	T (K)	ρ ($10^{-1}\Omega\text{-cm.}$)
166	186.52	1.88619	195	215.5	2.05262	224	244.52	2.25922
167	187.51	1.8728	196	216.5	2.0507	225	245.53	2.27069
168	188.54	1.89767	197	217.54	2.06409	226	246.57	2.28408
169	189.57	1.90532	198	218.55	2.06027	227	247.53	2.286
170	190.51	1.91106	199	219.53	2.06601	228	248.53	2.28982
171	191.54	1.90914	200	220.5	2.07366	229	249.56	2.29556
172	192.54	1.9321	201	221.54	2.08131	230	250.58	2.31087
173	193.57	1.91679	202	222.51	2.08131	231	251.48	2.31469
174	194.58	1.94549	203	223.53	2.08896	232	252.54	2.32426
175	195.51	1.95123	204	224.53	2.10427	233	253.58	2.33571
176	196.55	1.95314	205	225.54	2.11000	234	254.51	2.33574
177	197.52	1.97227	206	226.54	2.1234	235	255.55	2.34721
178	198.52	1.97801	207	227.55	2.13105	236	256.59	2.34913
179	199.55	1.95123	208	228.53	2.13679	237	257.5	2.35869
180	200.55	1.95888	209	229.57	2.14635	238	258.54	2.37208
181	201.52	1.96462	210	230.53	2.16357	239	259.56	2.36826
182	202.5	1.96462	211	231.51	2.16548	240	260.56	2.37973
183	203.54	1.9761	212	232.55	2.17696	241	261.55	2.38356
184	204.51	1.97801	213	233.52	2.17696	242	262.53	2.39312
185	205.53	1.99905	214	234.56	2.1827	243	263.49	2.40269
186	206.54	2.00097	215	235.5	2.19226	244	264.55	2.40651
187	207.52	2.0067	216	236.51	2.19609	245	265.59	2.41225
188	208.53	2.01244	217	237.53	2.20374	246	266.5	2.42182
189	209.55	2.02201	218	238.51	2.21331	247	267.5	2.42564
190	210.51	2.02201	219	239.51	2.21904	248	268.58	2.43138
191	211.54	2.02966	220	240.53	2.23052	249	269.53	2.43521
192	212.54	2.03157	221	241.57	2.23817	250	270.55	2.43712
193	213.51	2.04114	222	242.57	2.24391	251	271.55	2.44286
194	214.55	2.04305	223	243.56	2.24774	252	272.52	2.45434

No	T (K)	ρ ($10^{-1}\Omega\text{-cm.}$)
253	273.56	2.45625
254	274.56	2.46582
255	275.52	2.47347
256	276.53	2.48112
257	277.51	2.47921
258	278.51	2.48495
259	279.53	2.49642
260	280.53	2.51173
261	281.57	2.51555

ประวัติผู้เขียน

ชื่อ	นางสาว นุชจิรา ดีแจ้ง
วัน เดือน ปีเกิด	15 มกราคม 2517
ประวัติการศึกษา	สำเร็จการศึกษาระดับมัธยมศึกษาปีที่ 6 โรงเรียนลาซาลโชติรวี นครสวรรค์ เมื่อปีการศึกษา 2534 จังหวัดนครสวรรค์ สำเร็จการศึกษาระดับปริญญาตรี เกียรตินิยมอันดับ 2 สาขา ฟิสิกส์ คณะวิทยาศาสตร์ มหาวิทยาลัยนเรศวร จังหวัดพิษณุโลก เมื่อปีการศึกษา 2539
ทุนการศึกษา	ได้รับทุนการศึกษาของบริษัทเครือเจริญโภคภัณฑ์ ปีการศึกษา 2538 ได้รับทุนอุดหนุนการศึกษา 400 ปีสมเด็จพระนเรศวรมหาราช ปีการศึกษา 2539