Sensitivity:

The luminescence output (signal/integral) per unit of mass per unit of dose ***(counts/(mgr.Gy))***

$$S = \frac{(TL)\ or\ (OSL)}{D \cdot m}$$

Usually sensitivity changes upon differnet samples. The more sensitive a material is, the easier way to detect low doses with low mass in the disk.

The variations in sensitivities among dosimeters of the main material and batch are mainly due to following reasons:

1. ***Variation in the mass of the detectors***
2. ***Variation in the optical density***
3. ***Variation due to dirt contamination***

Sensitization:

The change of sensitivity after:

1. ***Dose***
2. ***Heating - Annealing***
3. ***Dose + Heating***
4. ***Bleaching???!!!***

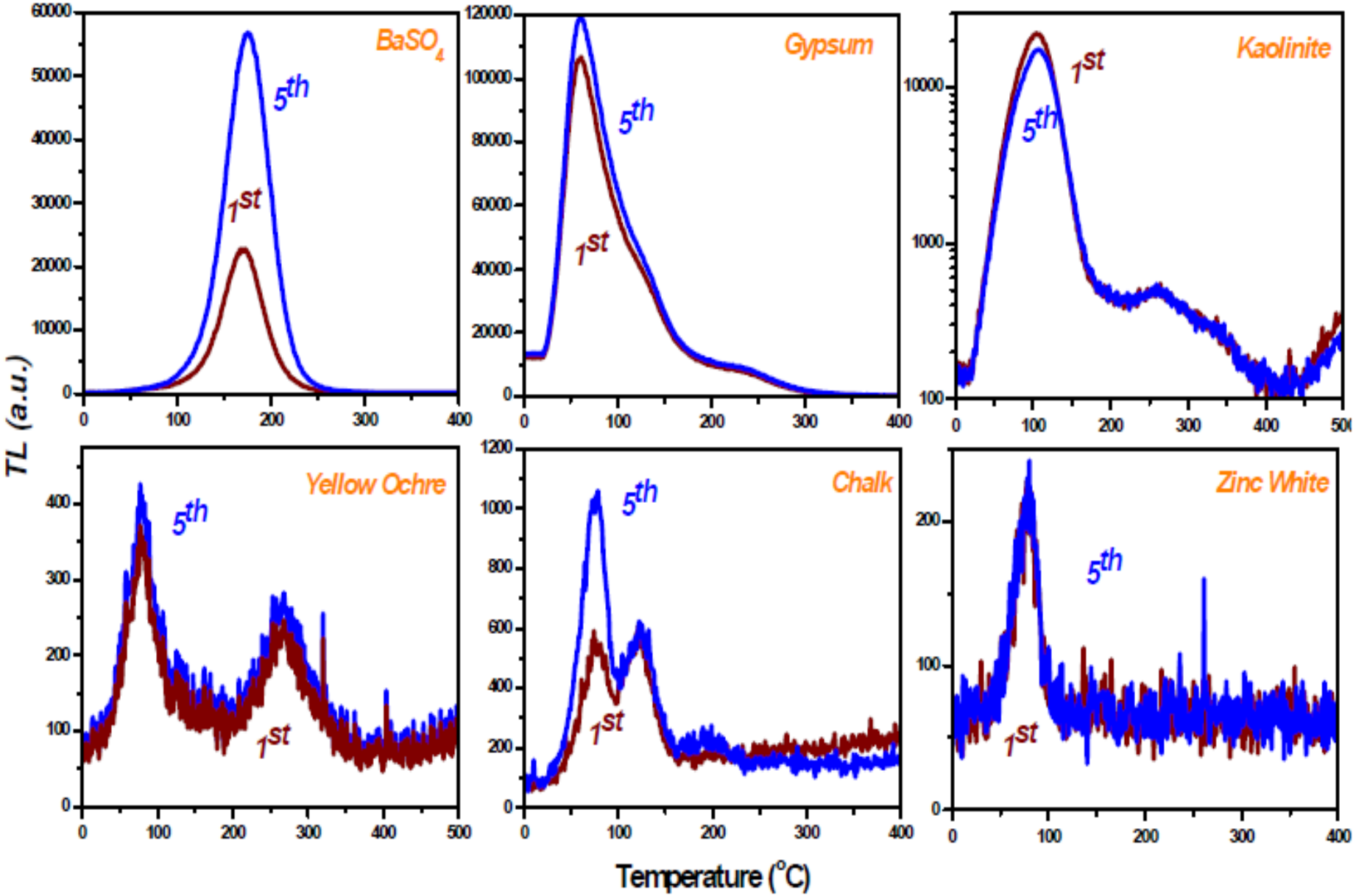
Annealing is the thermal treatment needs to erase any irradiation memory from the dosimetric material.

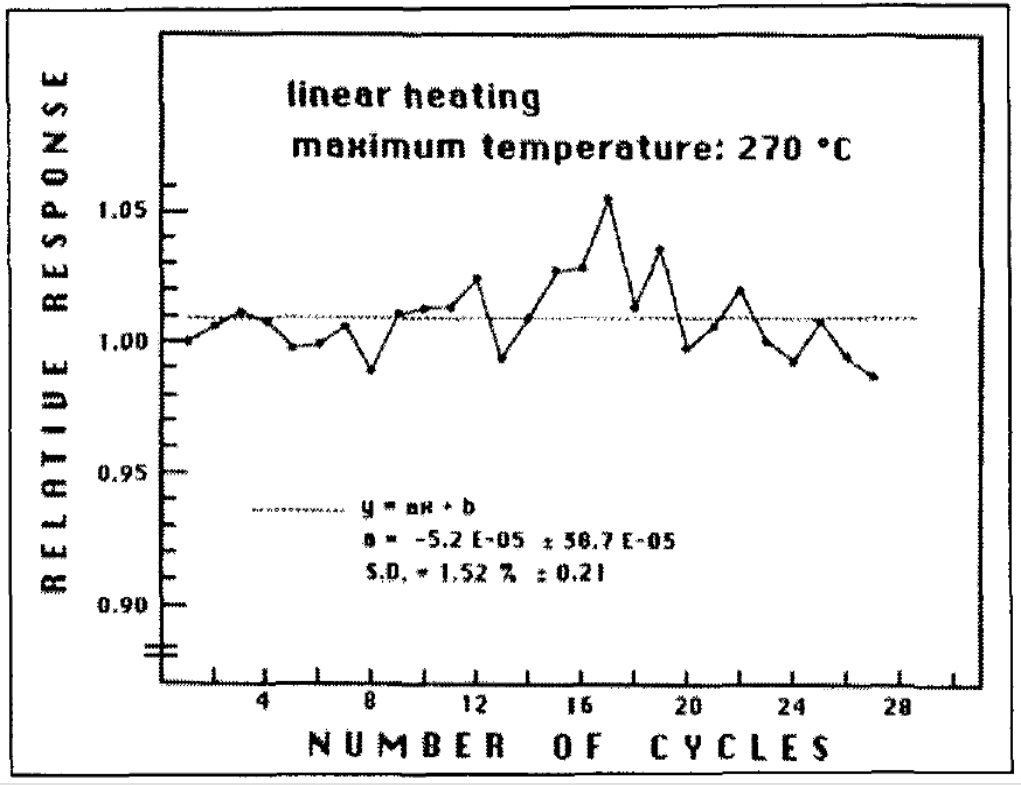
Some thermoluminescent material required a complex annealing procedure.

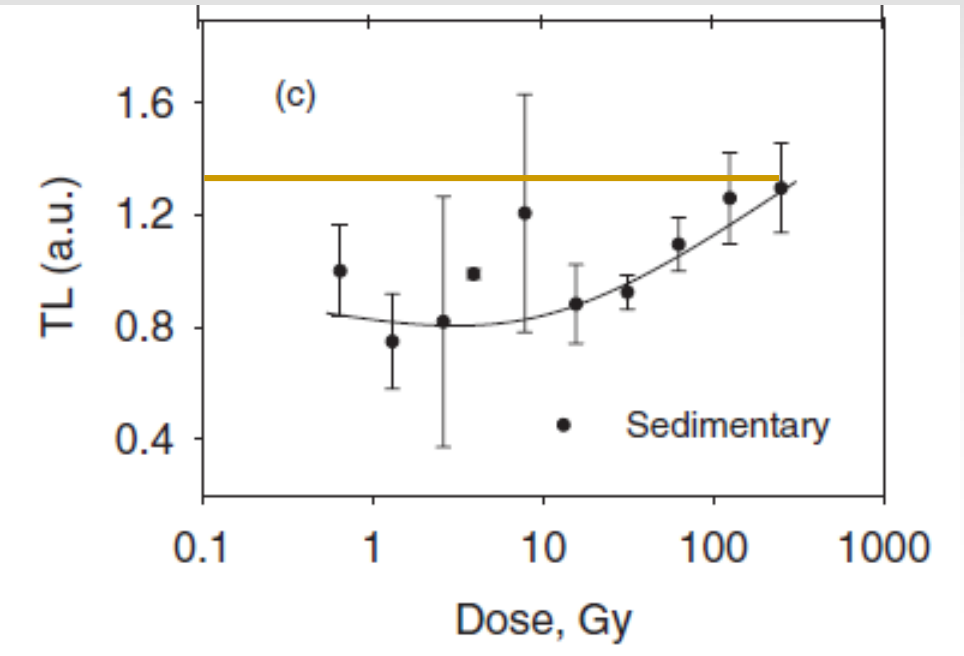
TOOL: Normalisation = divide by the first measurement: → After normalisation the first measurement becomes equal to 1.

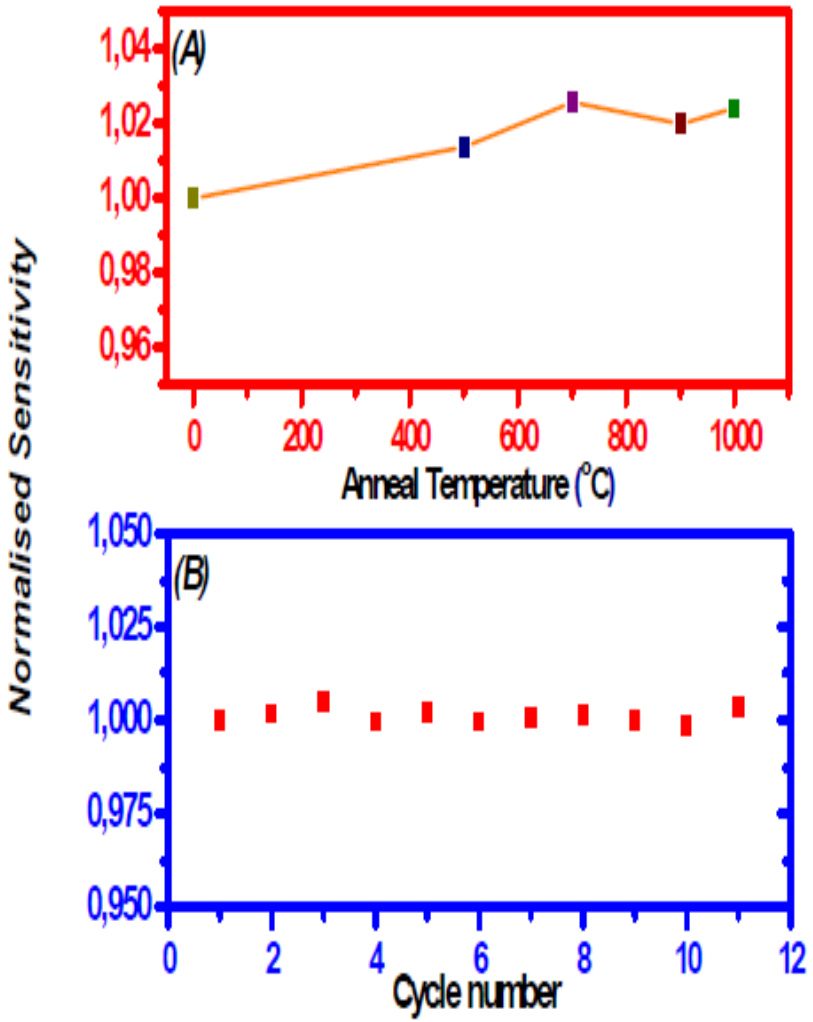
WHY?

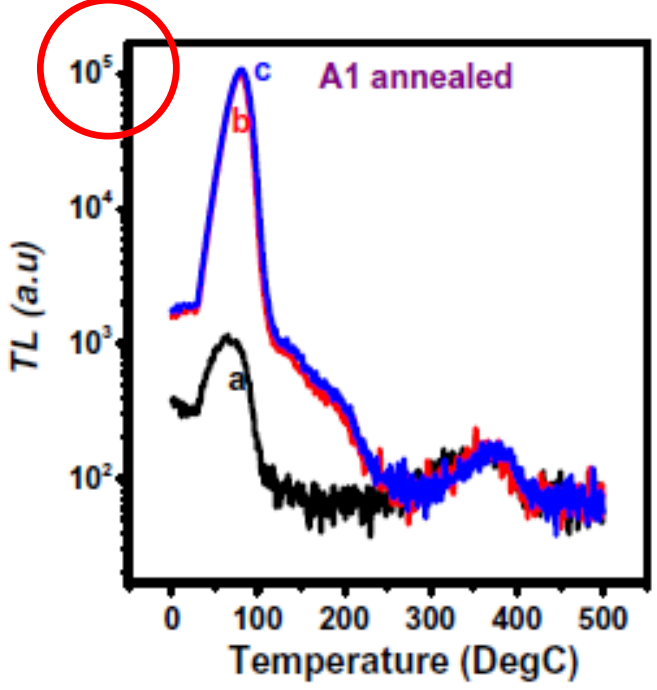
5 sequential irradiation-TL steps

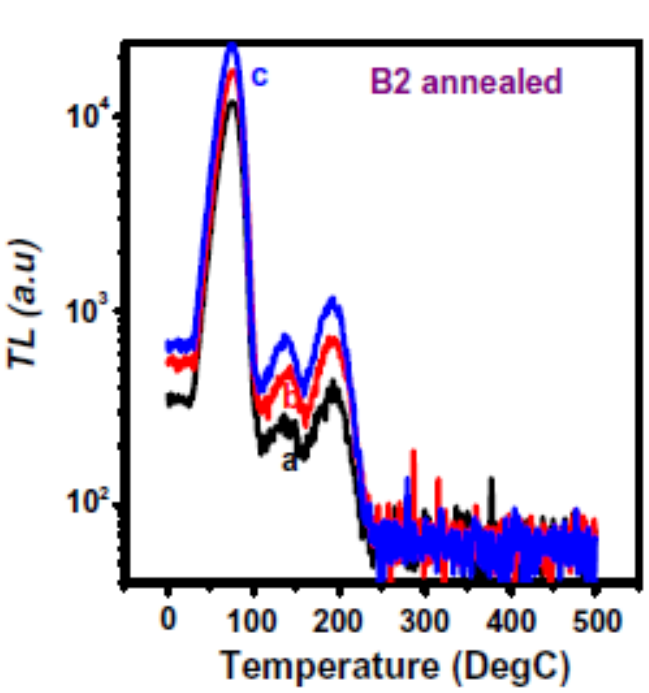



linear heating
maximum temperature: 270 °C
RELATIVE RESPONSE
1.05
1.00
0.95
0.90
y = aR + b
a = -5.2 E-05 ± 58.7 E-05
S.D. = 1.52 % ± 0.21
4
8
12
16
20
24
28
NUMBER OF CYCLES

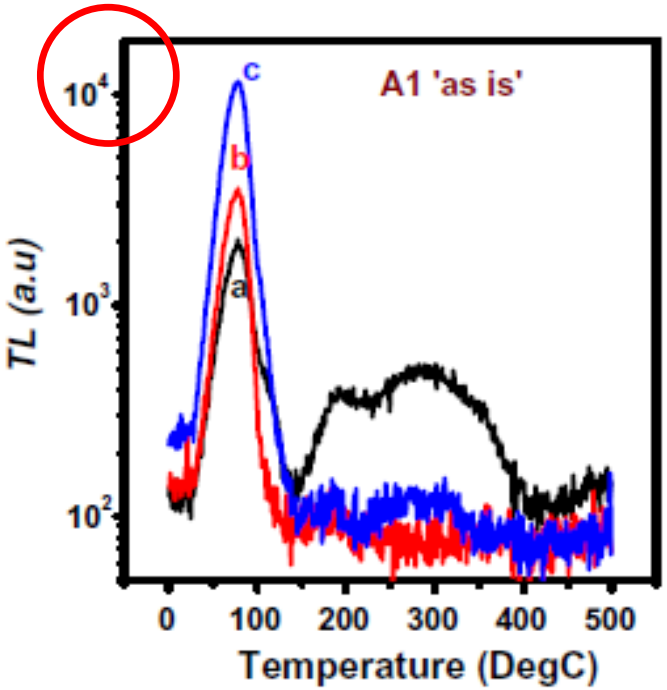

(c)
1.6
1.2
0.8
0.4
TL (a.u.)
Sedimentary
0.1
1
10
100
1000
Dose, Gy

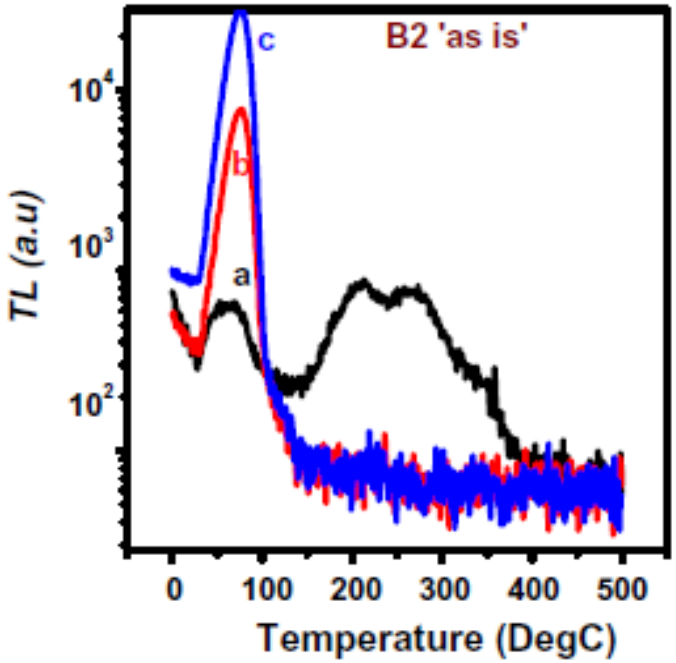

Normalised Sensitivity
(A)
1,04
1,02
1,00
0,98
0,96
0
200
400
600
800
1000
Anneal Temperature (°C)
(B)
1,050
1,025
1,000
0,975
0,950
0
2
4
6
8
10
12
Cycle number

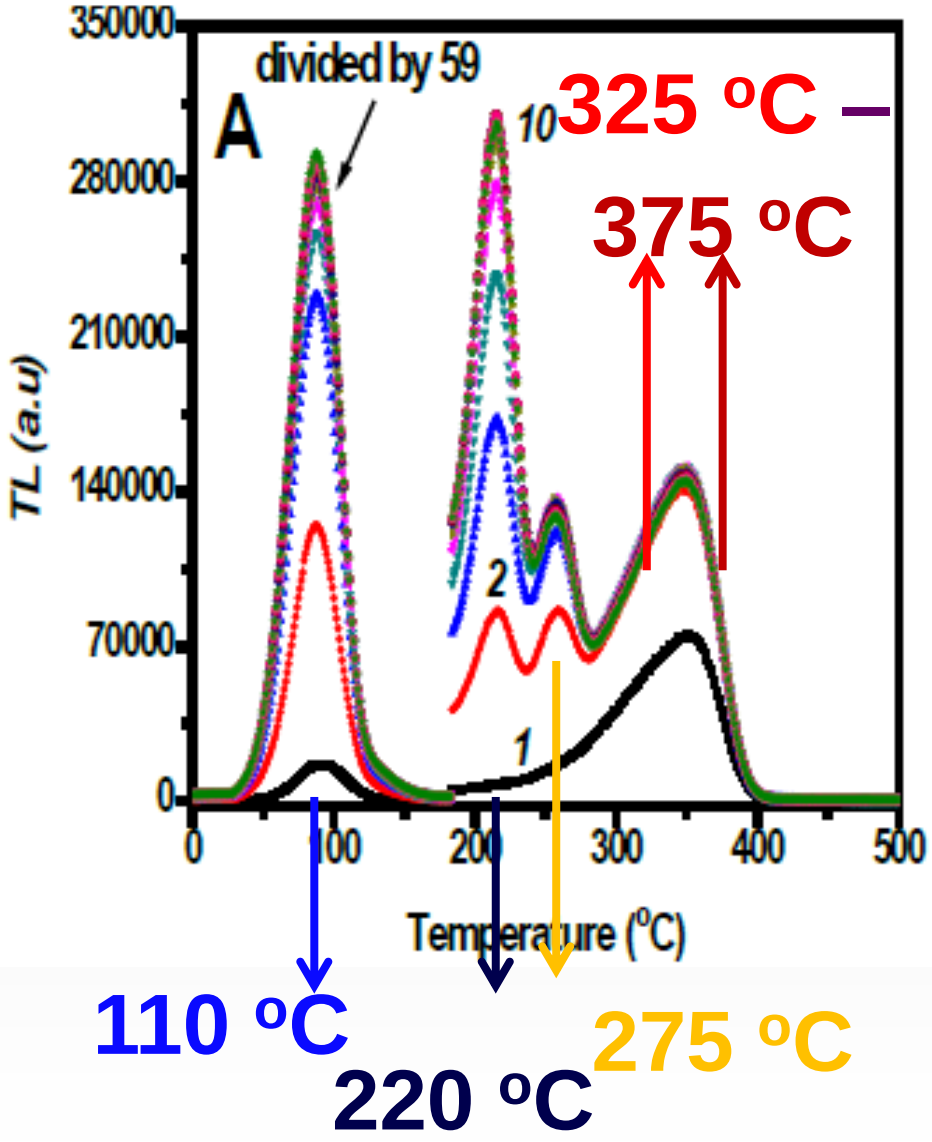


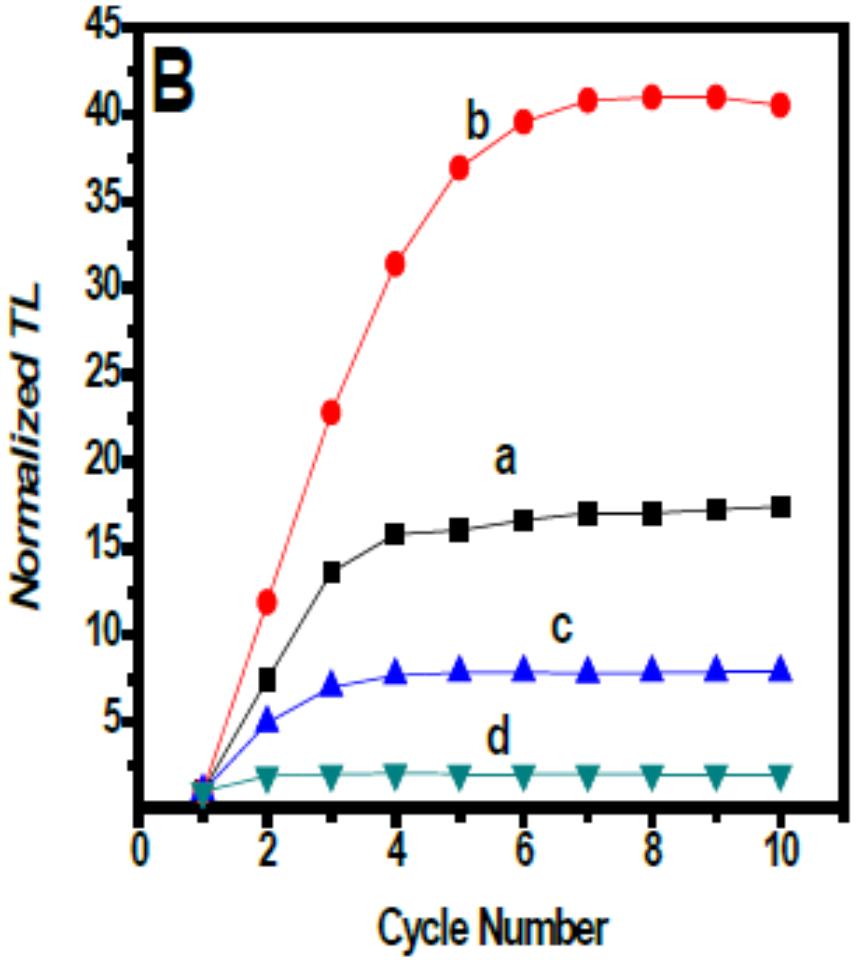


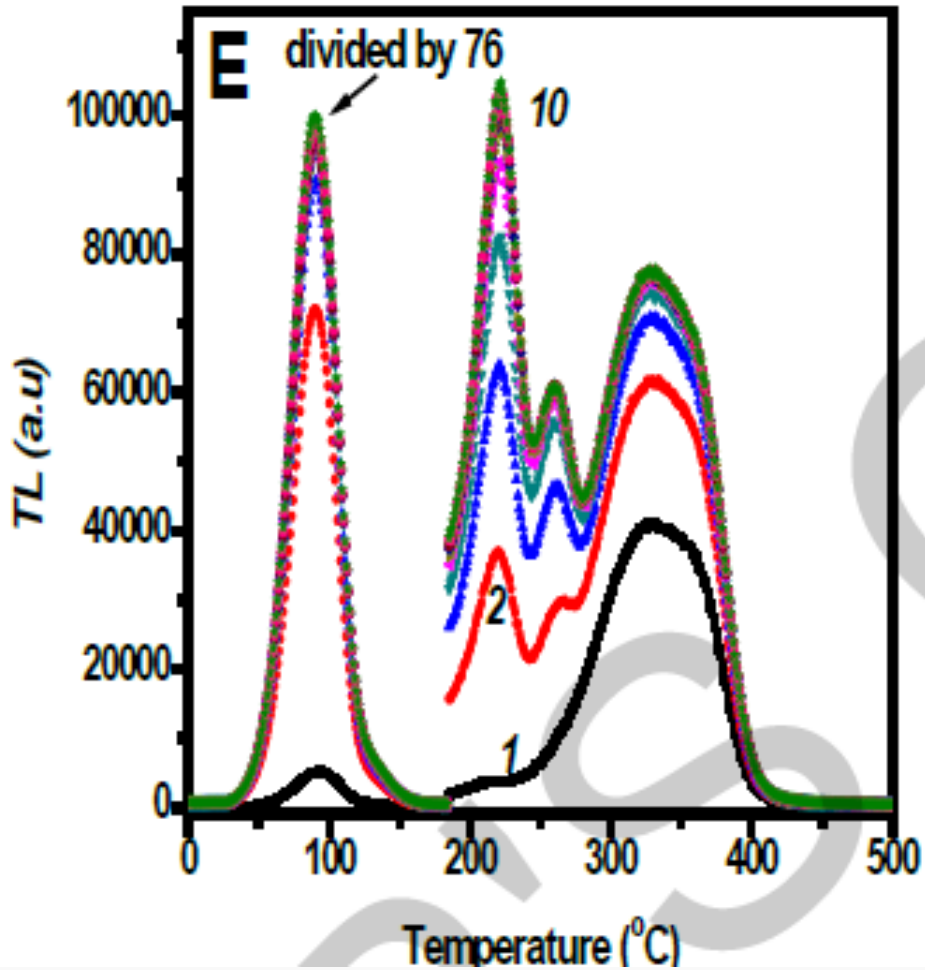
Same mass, Same dose, Same quartz type, Difference : Annealing

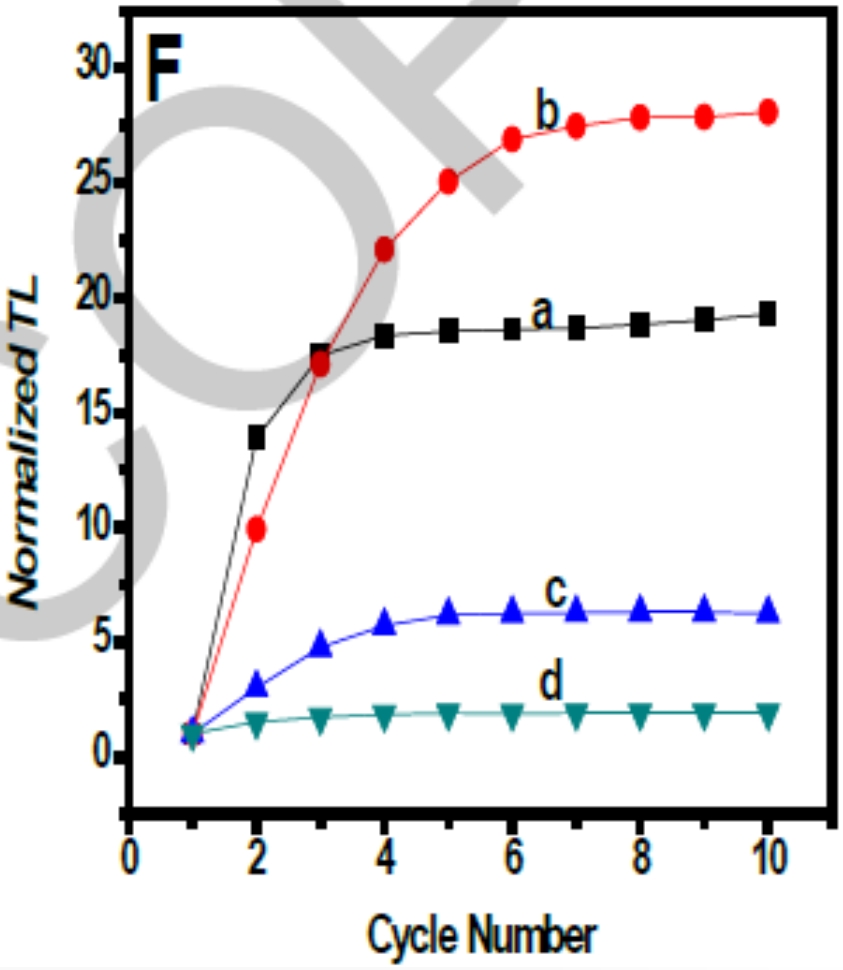


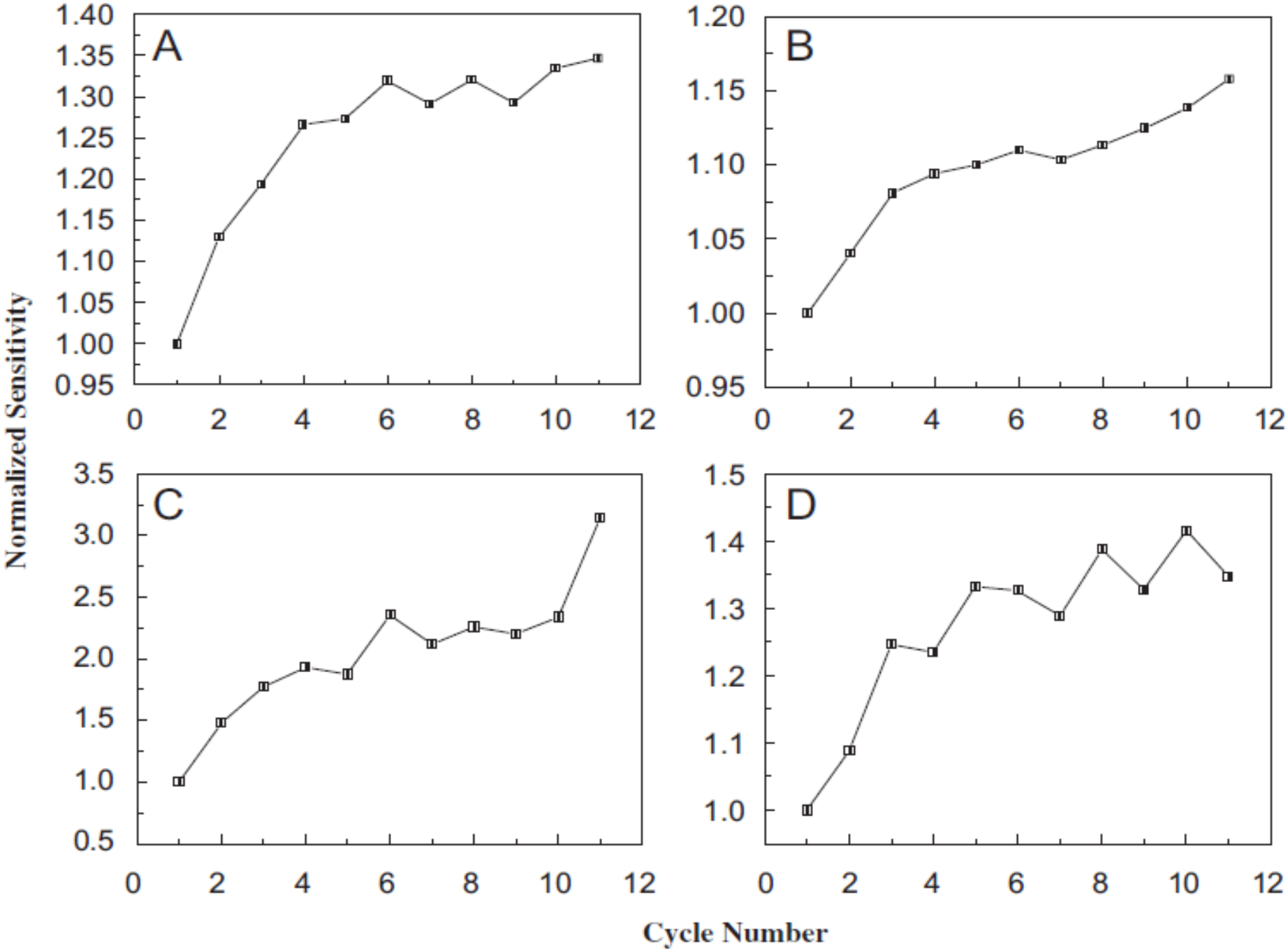


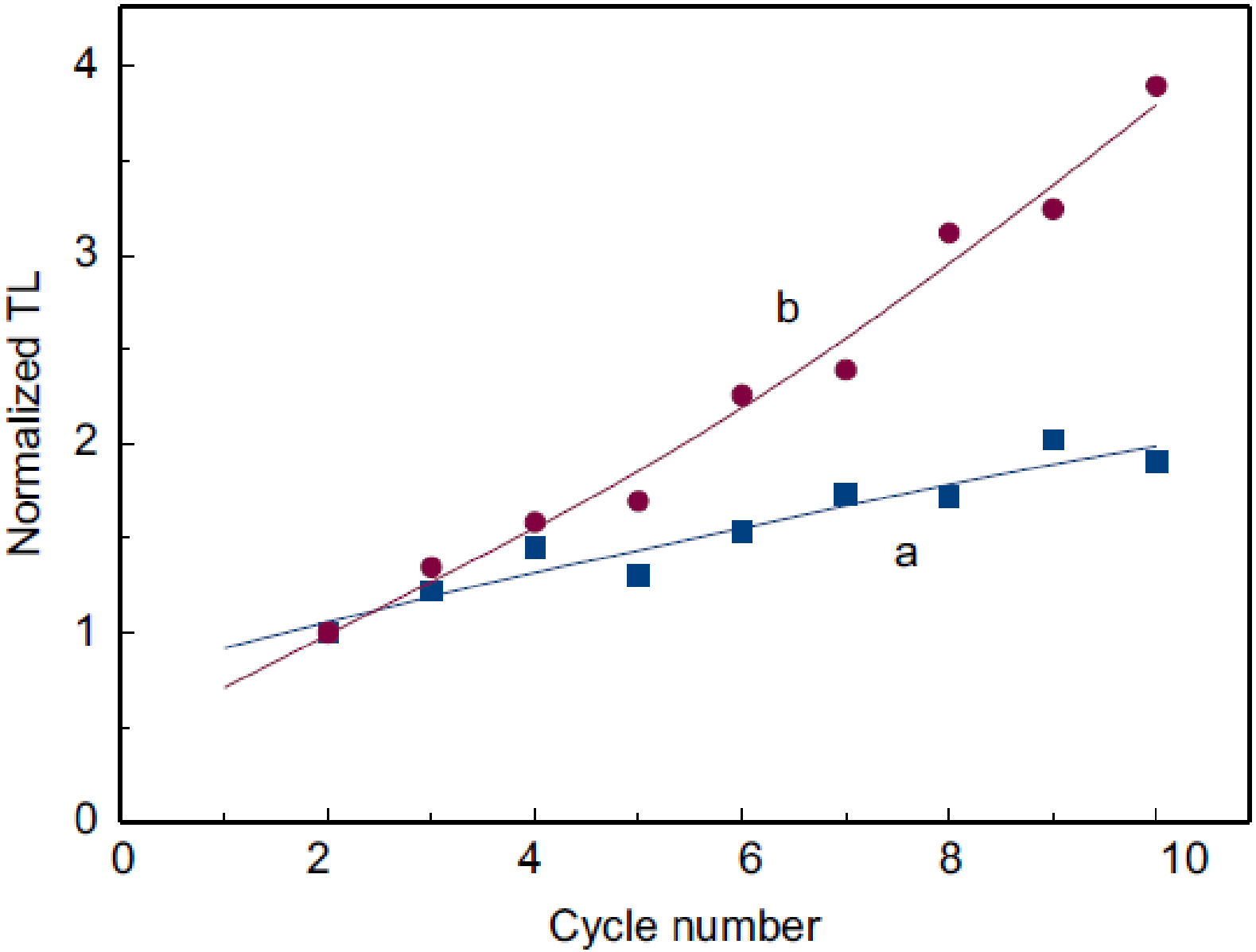

A
divided by 59
325 °C
375 °C
110 °C
220 °C
275 °C
TL (a.u)
Temperature (°C)
350000
280000
210000
140000
70000
0
0
100
200
300
400
500
10
2
1


B
b
a
c
d
Normalized TL
Cycle Number
45
40
35
30
25
20
15
10
5
0
2
4
6
8
10


E
divided by 76
10
2
1
TL (a.u)
Temperature (°C)
0
20000
40000
60000
80000
100000
0
100
200
300
400
500


F
b
a
c
d
Normalized TL
Cycle Number
0
5
10
15
20
25
30
0
2
4
6
8
10


A
B
C
D
Normalized Sensitivity
Cycle Number


Normalized TL
Cycle number
0
1
2
3
4
0
2
4
6
8
10
b
a