Medição da Temperatura por métodos de luminescência

GRUPO 14
FCUP

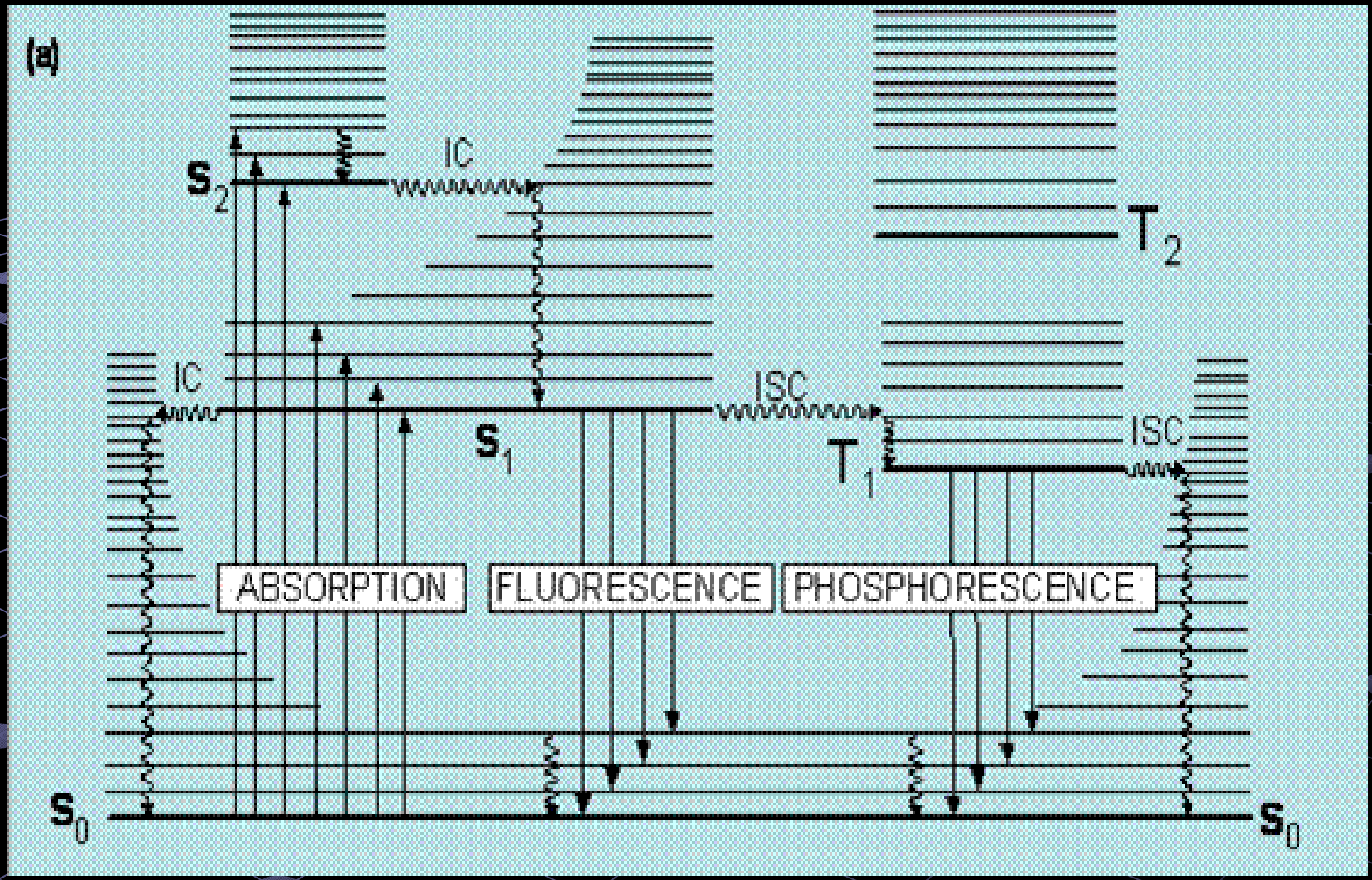
Conceitos:

Luminescência: Desactivação de um estado excitado por emissão de radiação.

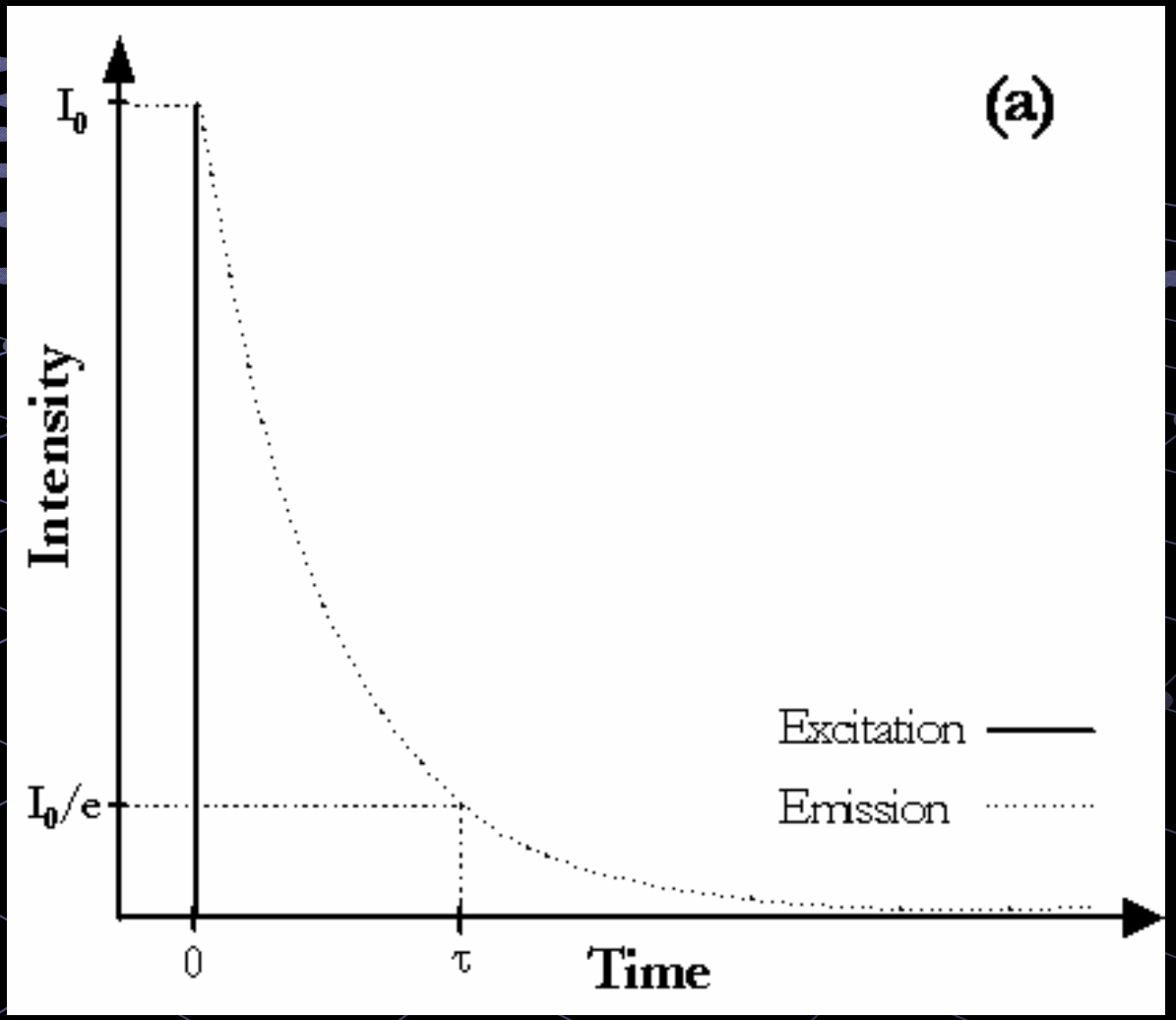
Fosforescência

Fluorescência

O que nos permite diferenciar fluorescência de fosforescência é o tempo que dura cada um dos fenómenos, sendo mais curto o da fluorescência.

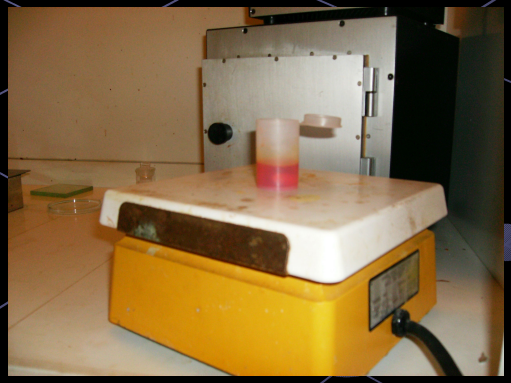

(a)
S2
IC
T2
IC
ISC
ISC
S1
T1
ABSORPTION
FLUORESCENCE
PHOSPHORESCENCE
S0
S0

Tempo de vida (longevidade)



Na Sala Limpa ...

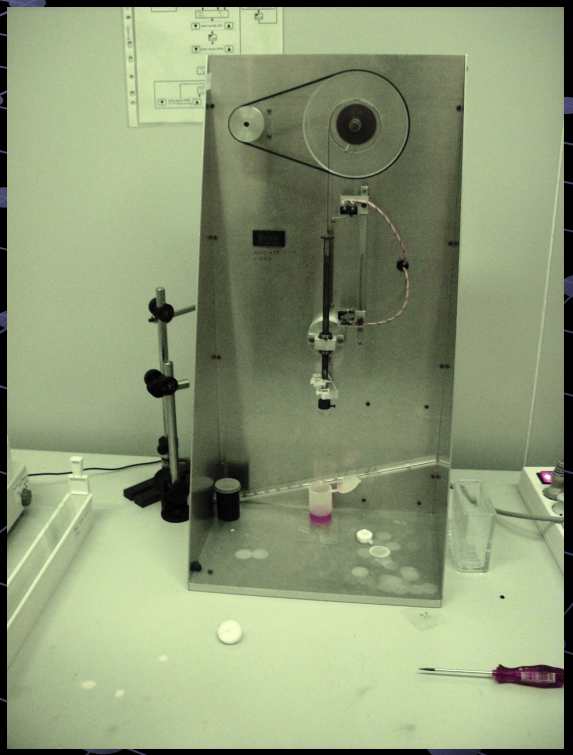
1º passo: preparar a solução



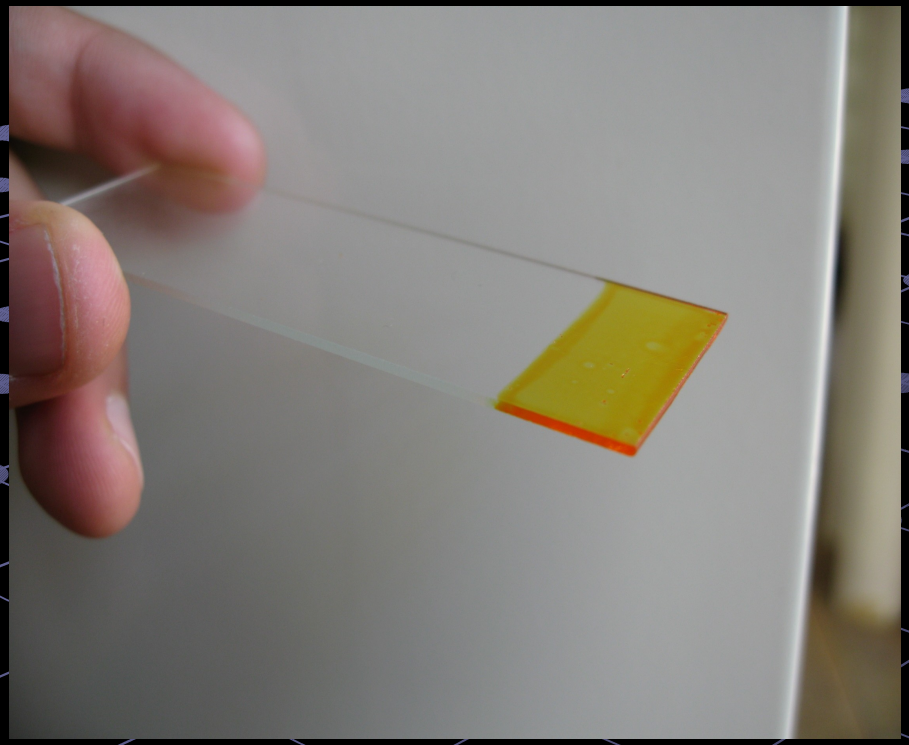
2º Passo: Depositar os filmes

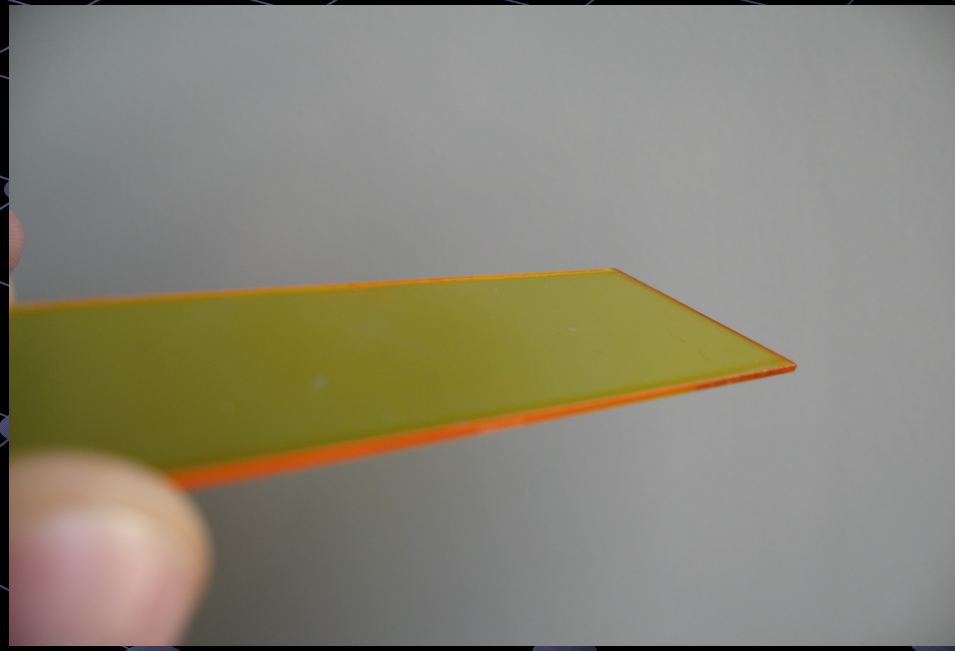
Spin Coating

Deep Coating



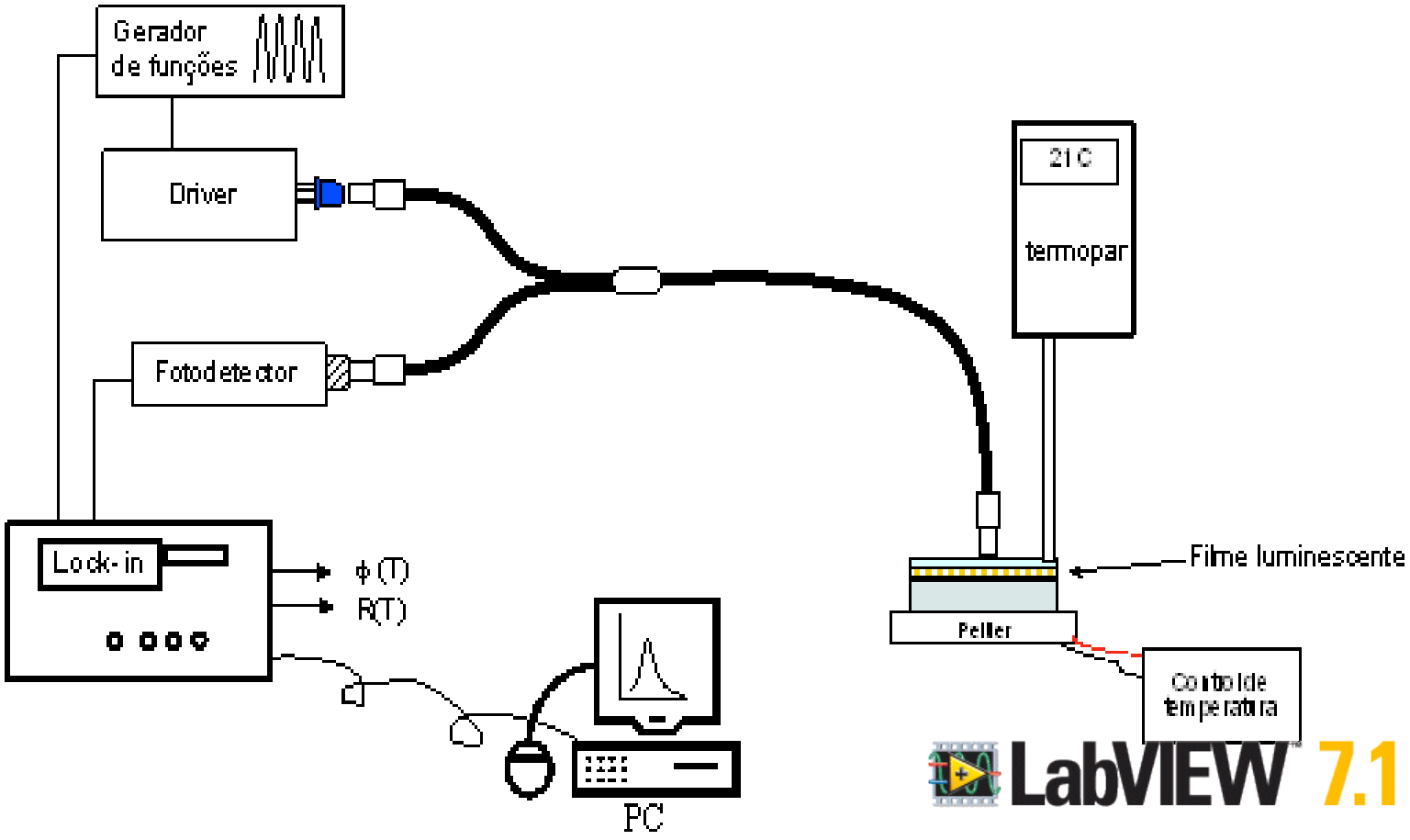
Resultado

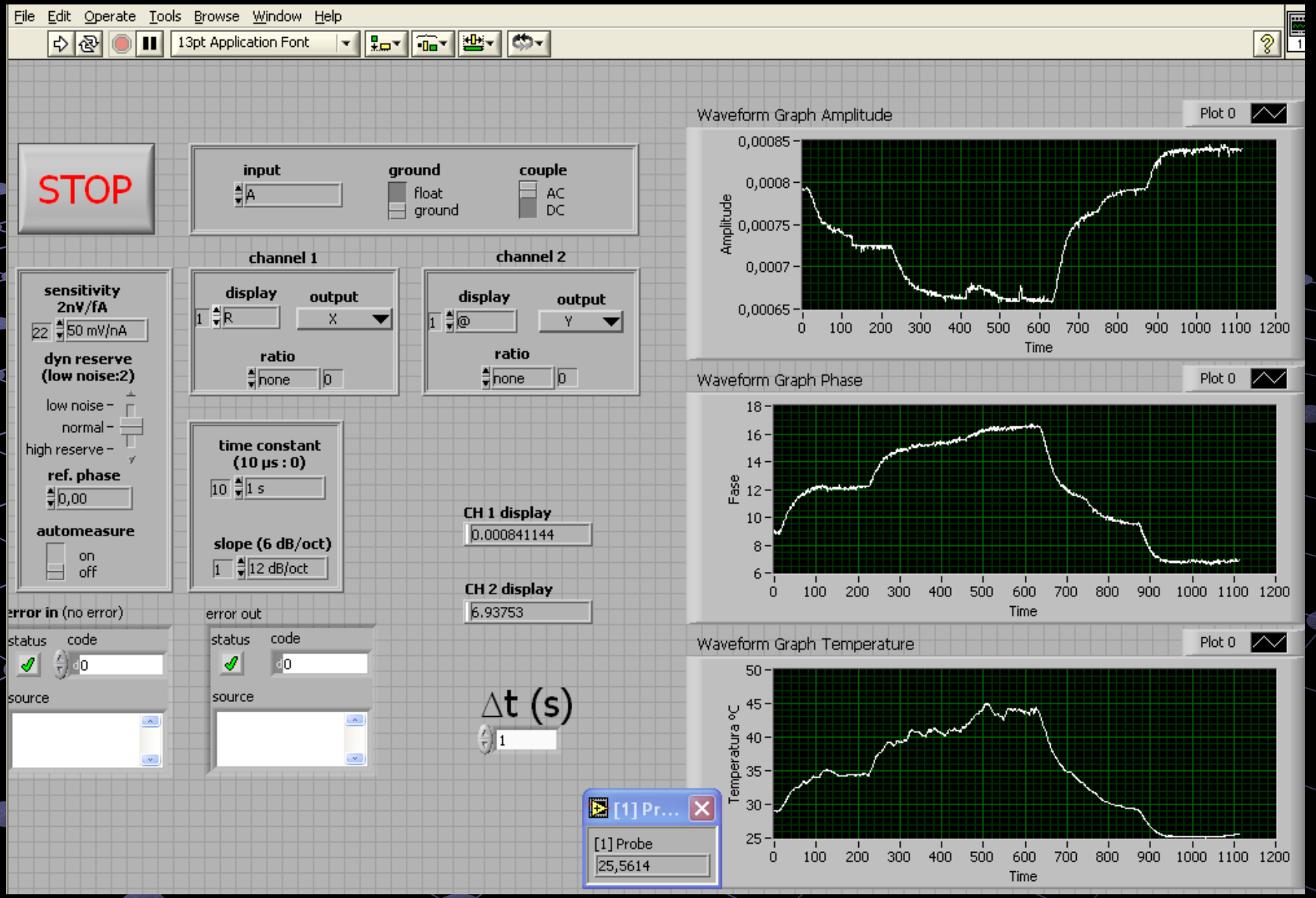




No Laboratório...

Esquema da montagem experimental




File Edit Operate Tools Browse Window Help
13pt Application Font
STOP
input
A
ground
float
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AC
DC
channel 1
display
output
1
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X
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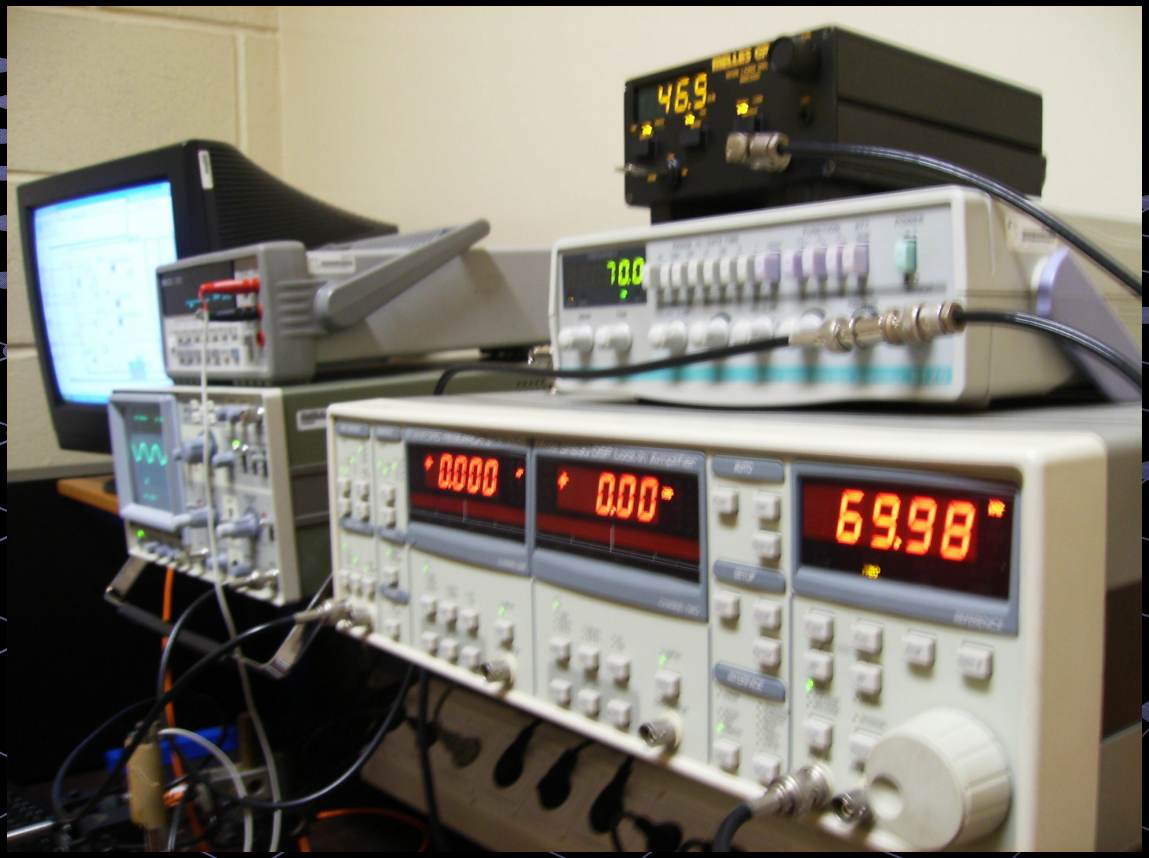
0
channel 2
display
output
1
@
Y
ratio
none
0
sensitivity
2nV/fA
22
50 mV/nA
dyn reserve
(low noise:2)
low noise
normal
high reserve
ref. phase
0,00
automeasure
on
off
time constant
(10 µs : 0)
10
1 s
slope (6 dB/oct)
1
12 dB/oct
CH 1 display
0.000841144
CH 2 display
6.93753
Δt (s)
1
error in (no error)
status
code
0
source
error out
status
code
0
source
Waveform Graph Amplitude
Plot 0
Amplitude
0,00085
0,0008
0,00075
0,0007
0,00065
0 100 200 300 400 500 600 700 800 900 1000 1100 1200
Time
Waveform Graph Phase
Plot 0
Fase
18 16 14 12 10 8 6
0 100 200 300 400 500 600 700 800 900 1000 1100 1200
Time
Waveform Graph Temperature
Plot 0
Temperatura °C
50 45 40 35 30 25
0 100 200 300 400 500 600 700 800 900 1000 1100 1200
Time
[1] Pr...
[1] Probe
25,5614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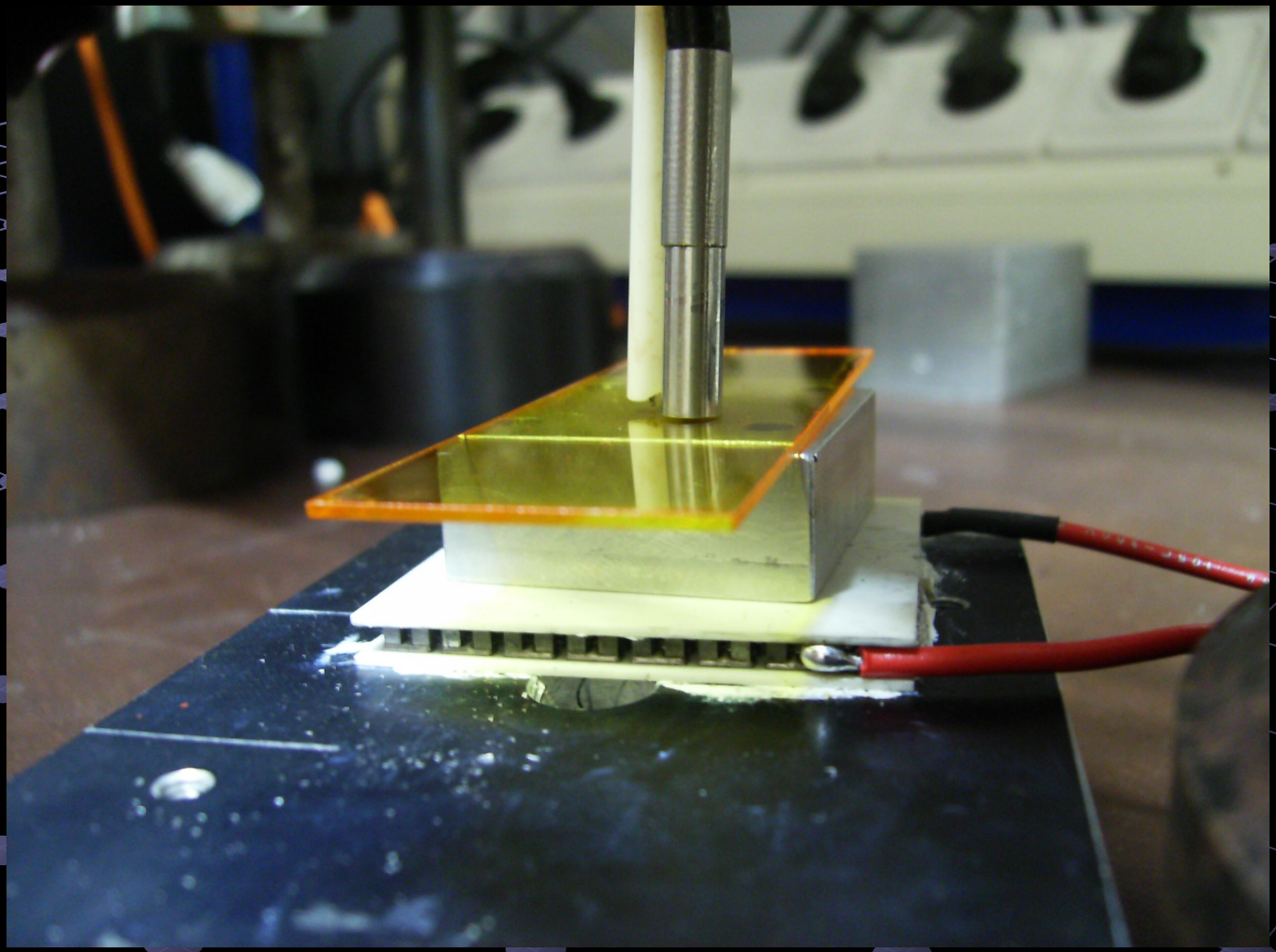
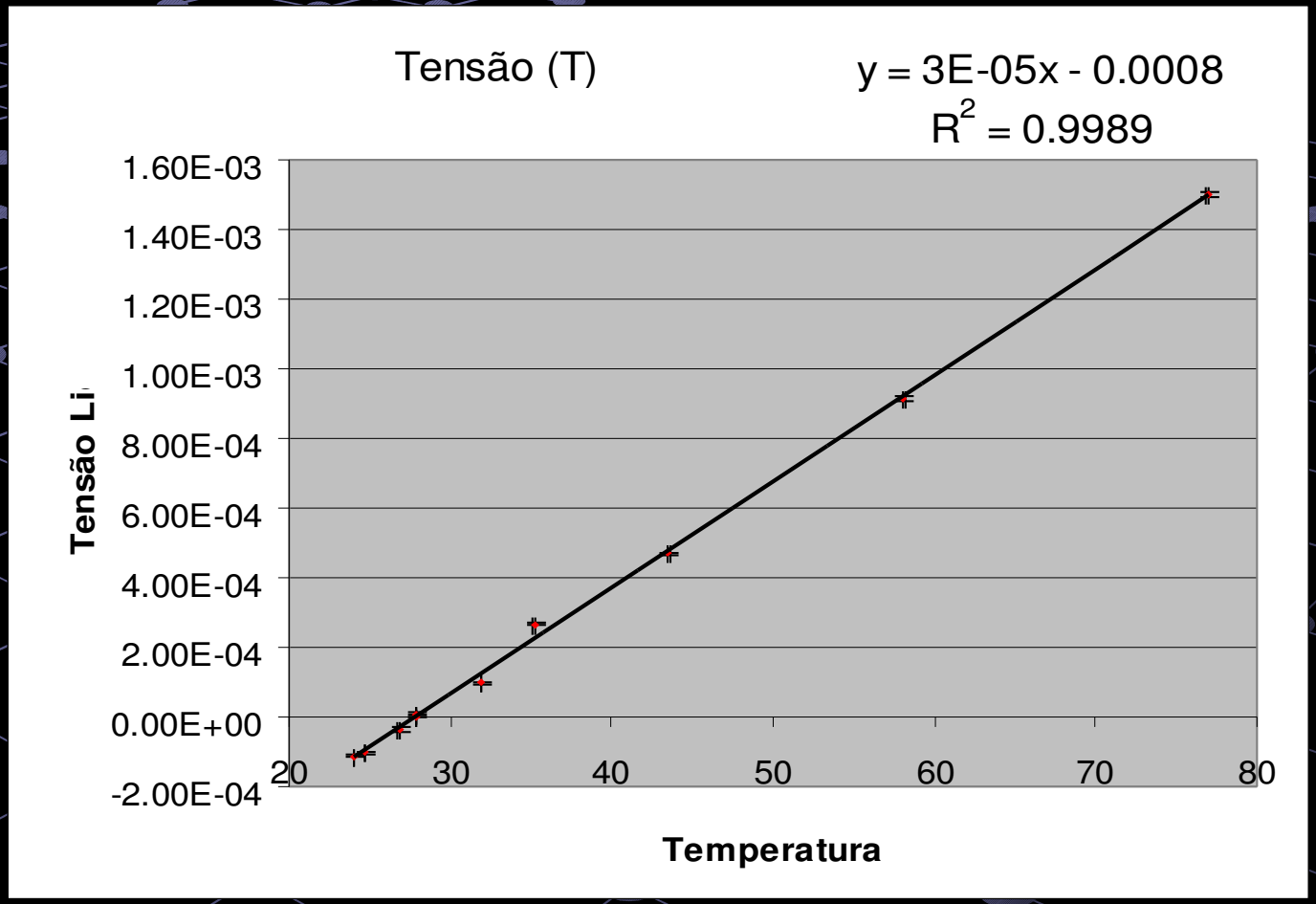
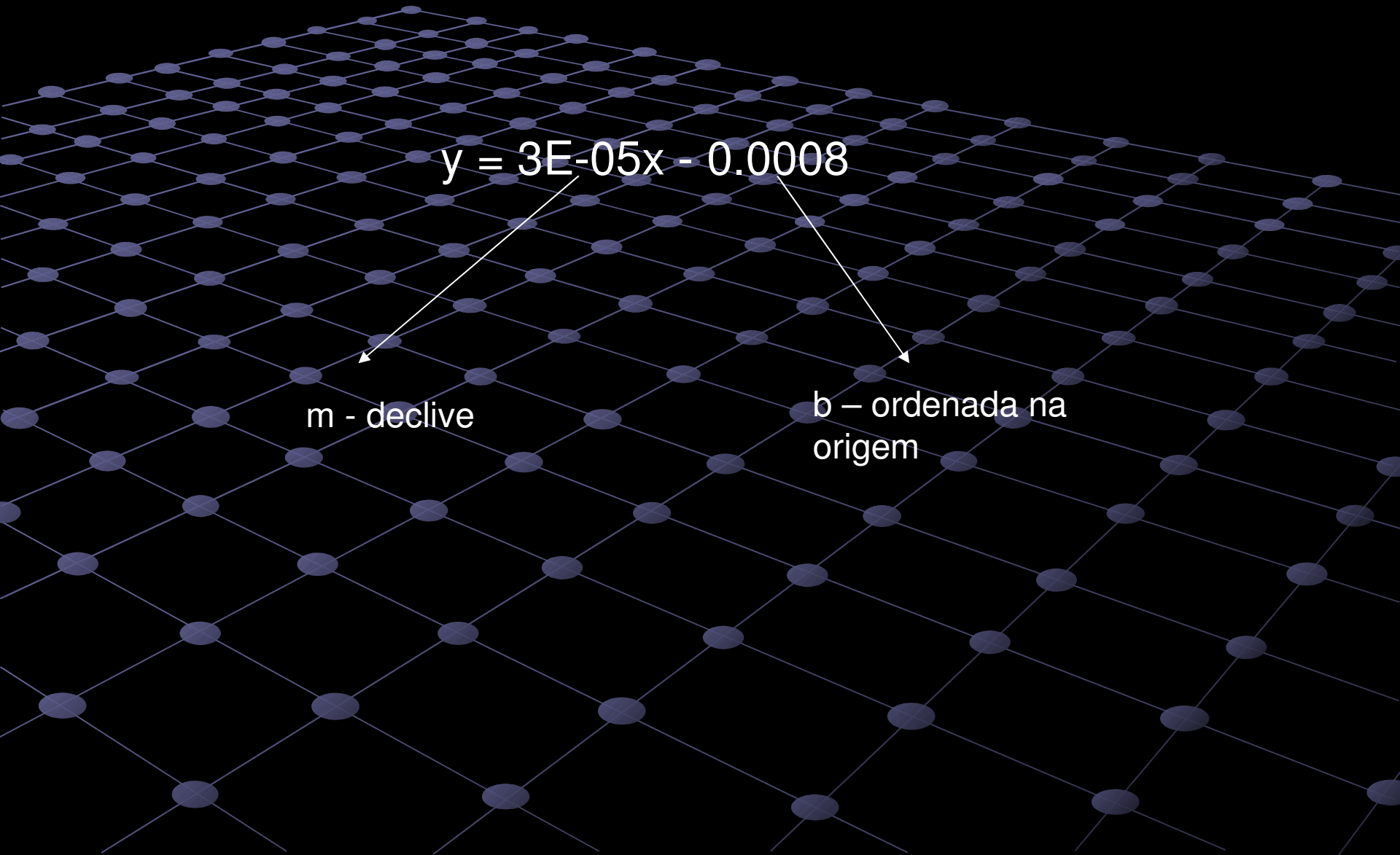
69.98



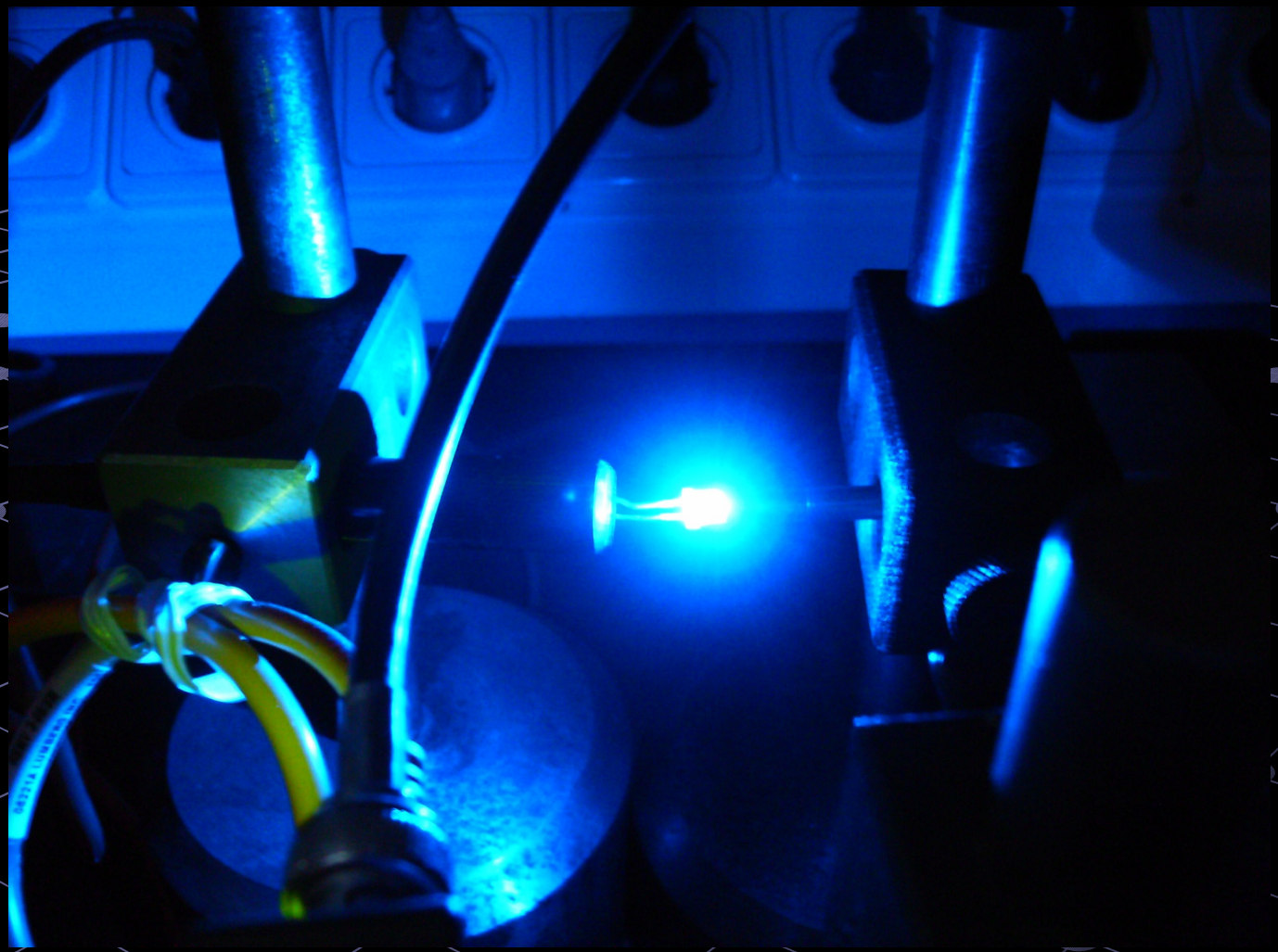
Primeiro passo: Calibração do termopar

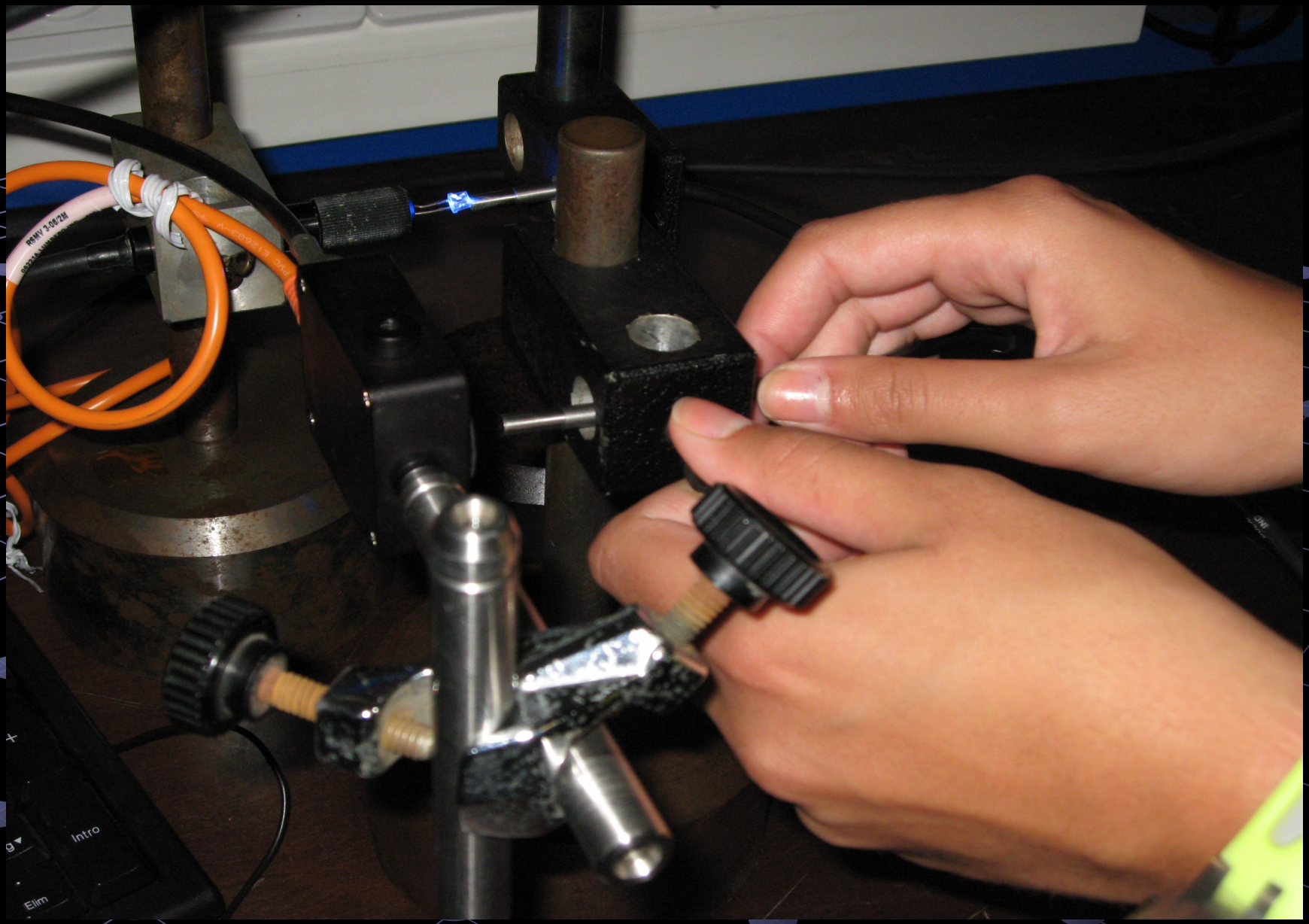


$$y = mx + b$$

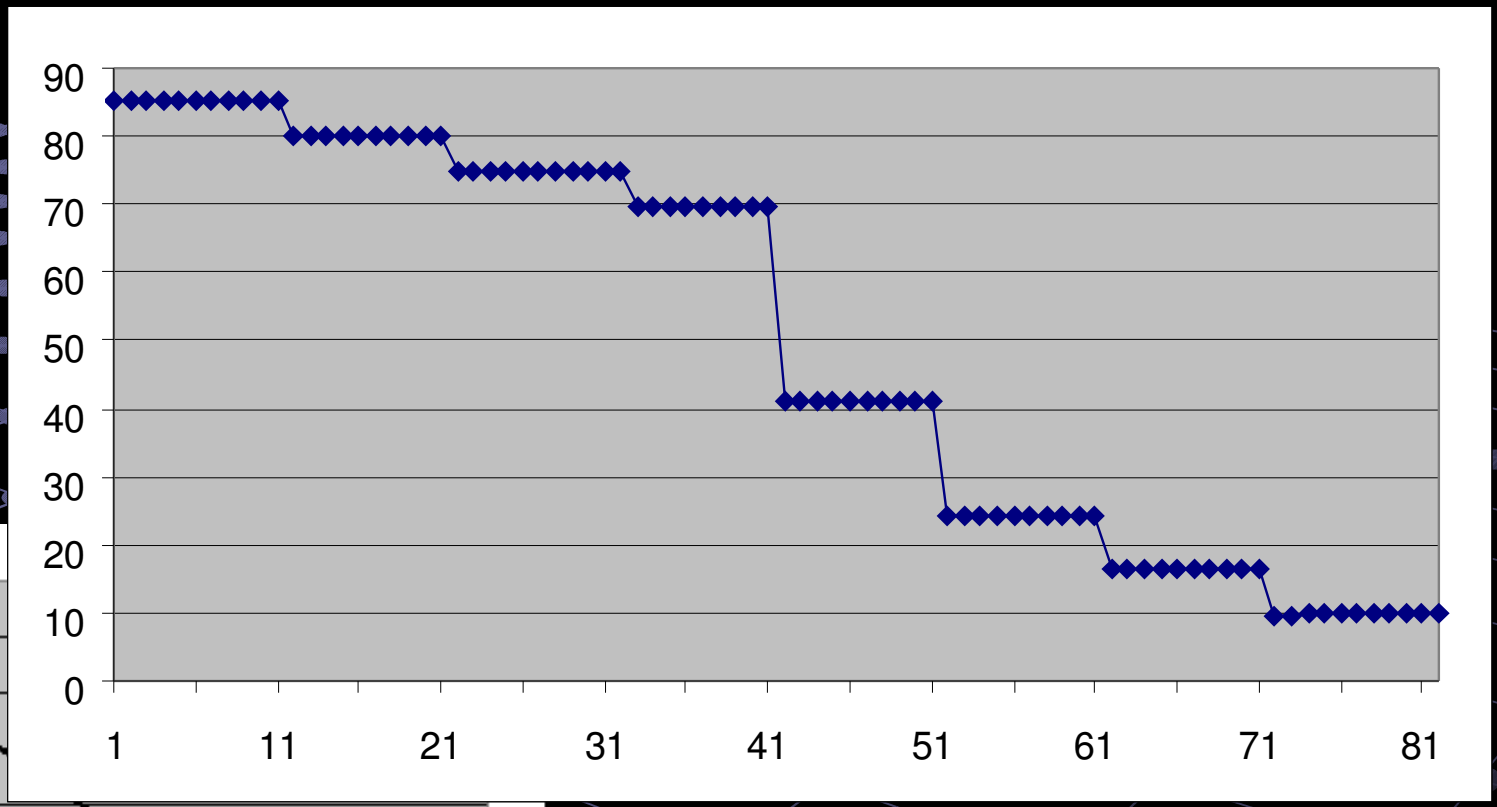


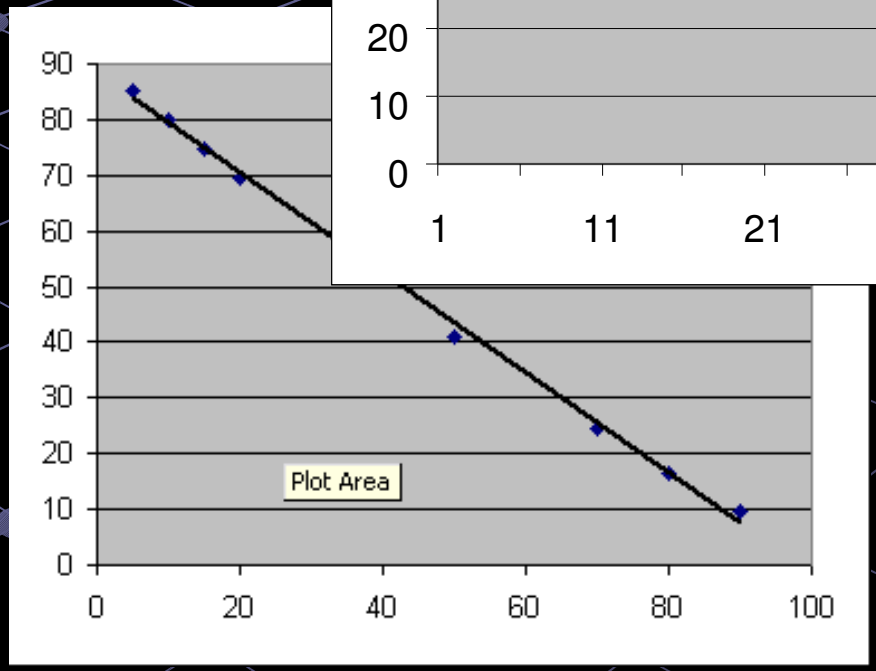
Segundo Passo: Alimentação e modulação do LED




Intro
Elim

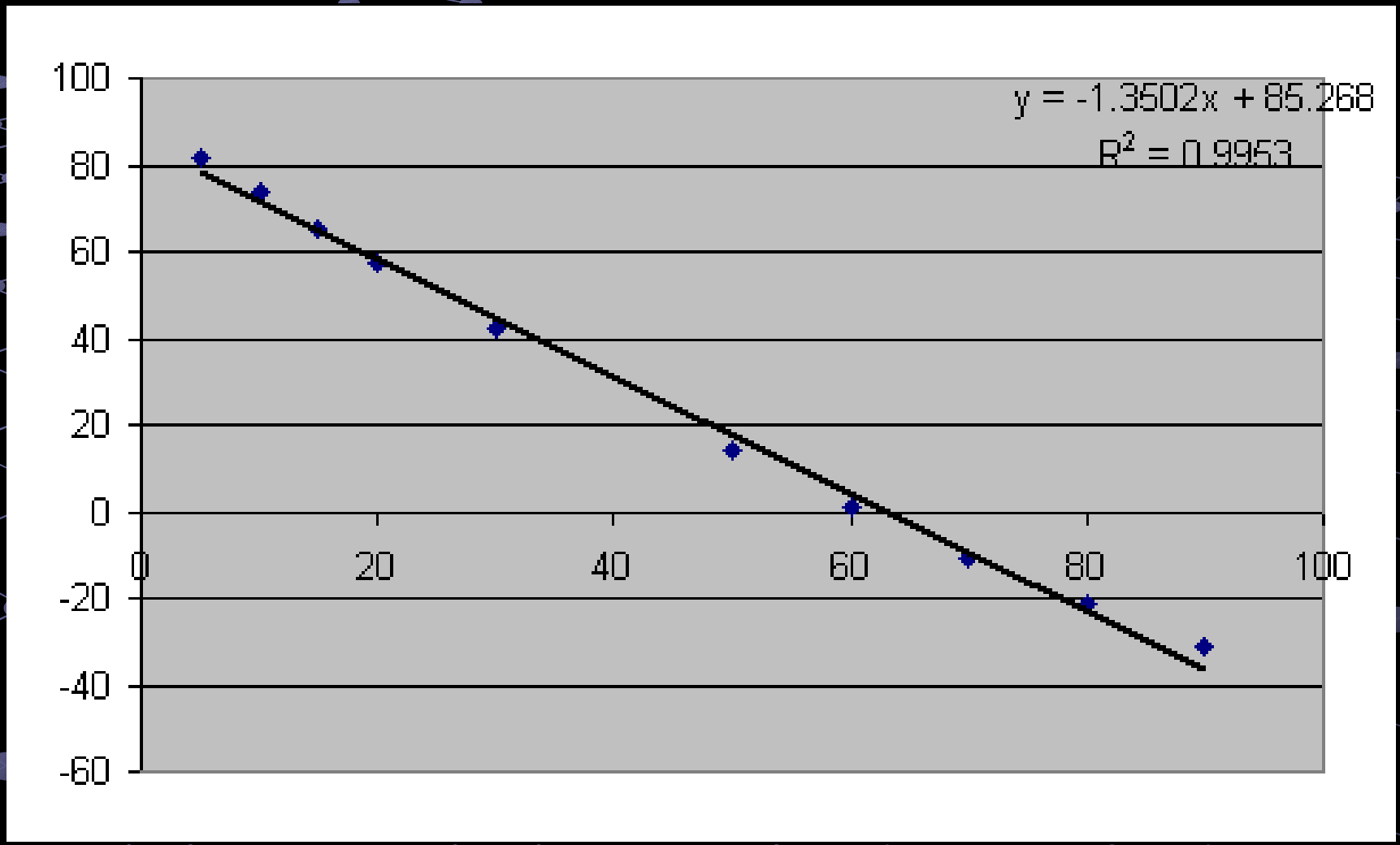
Terceiro Passo: Medição da Fase de Referência

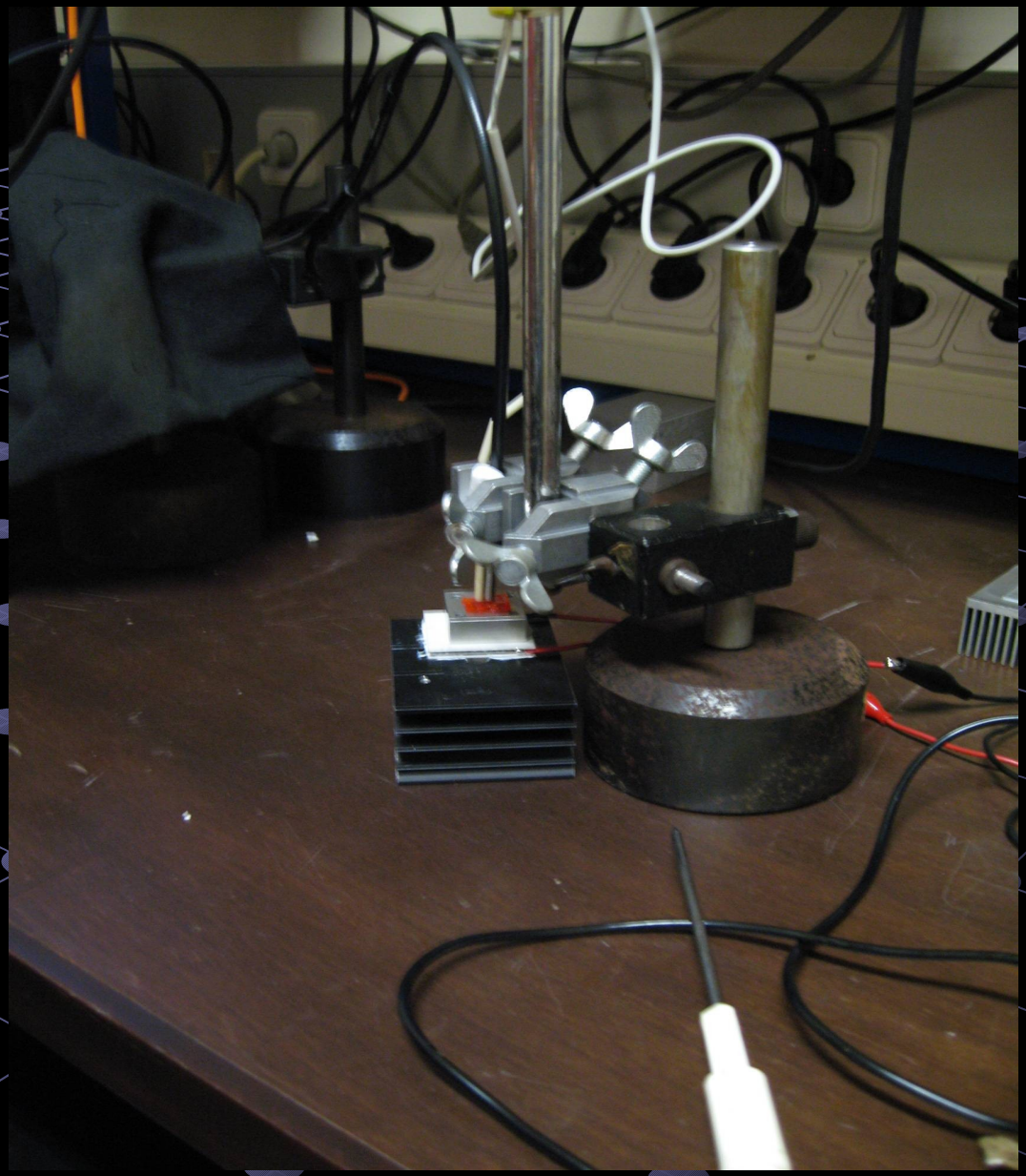




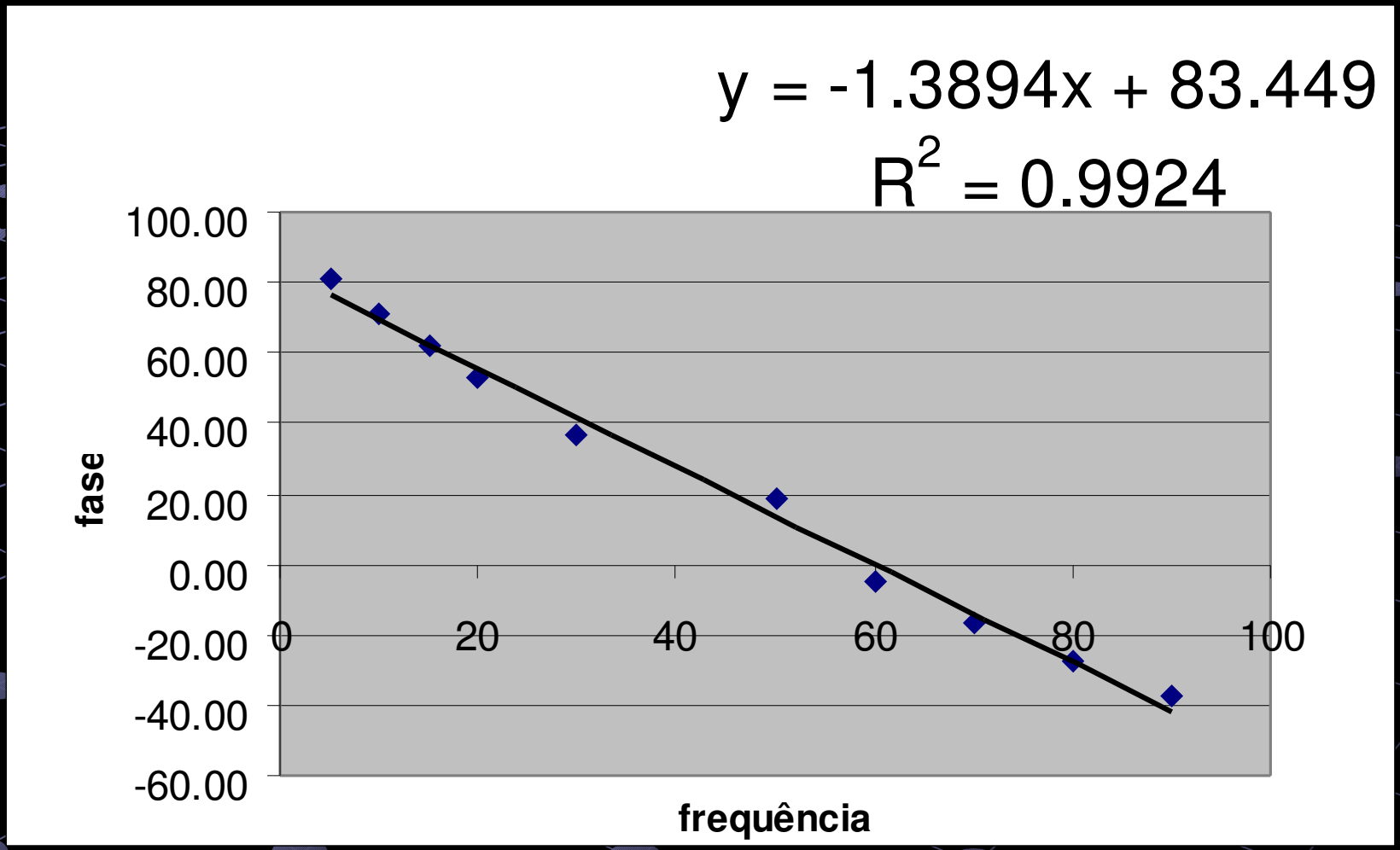
y = -0.8972x + 88.262
R2 = 0.9978

Medição da fase da amostra sólida



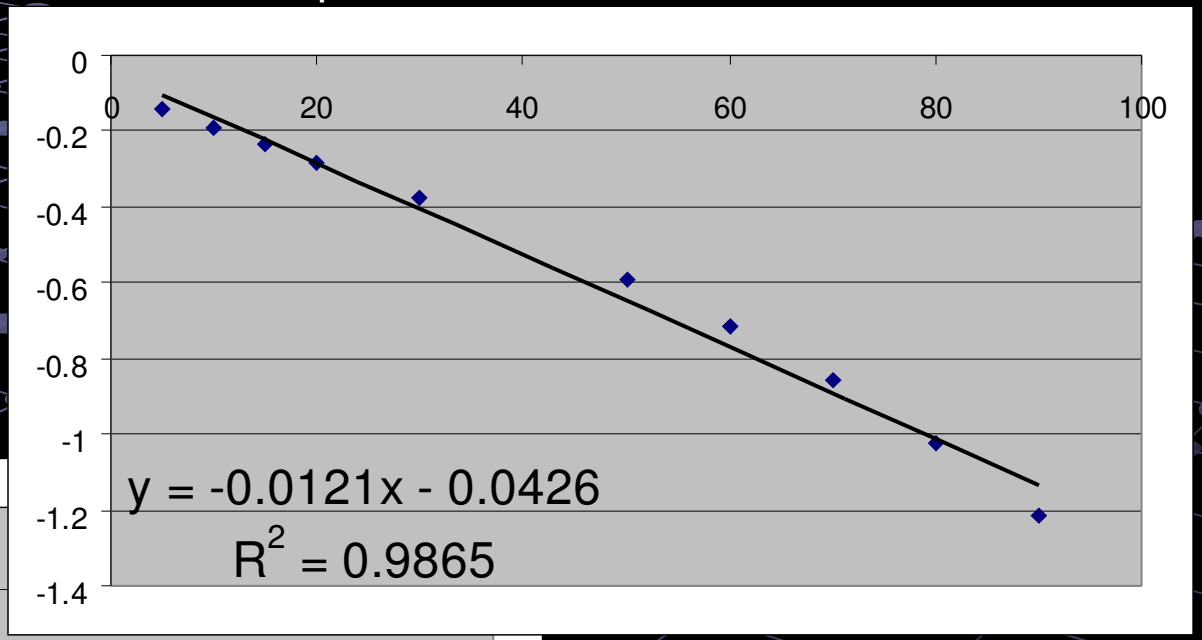


Medição da fase da fase da amostra em pó

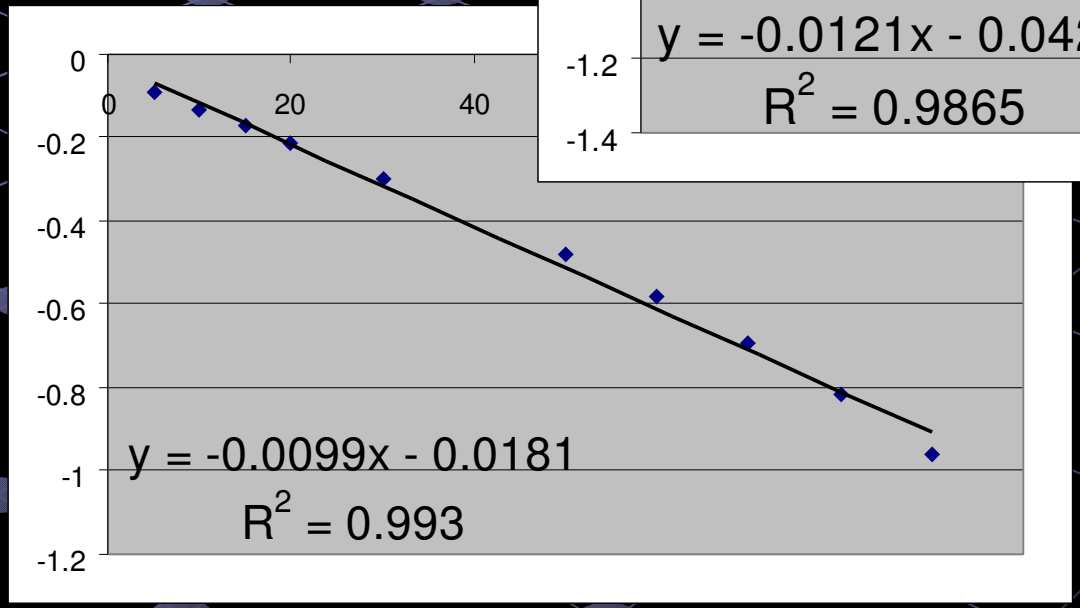


Quarto passo: Cálculo do tempo de vida da luminescência

Amostra em pó



Amostra sólida



$$\tan\phi = 2\pi f \tau$$

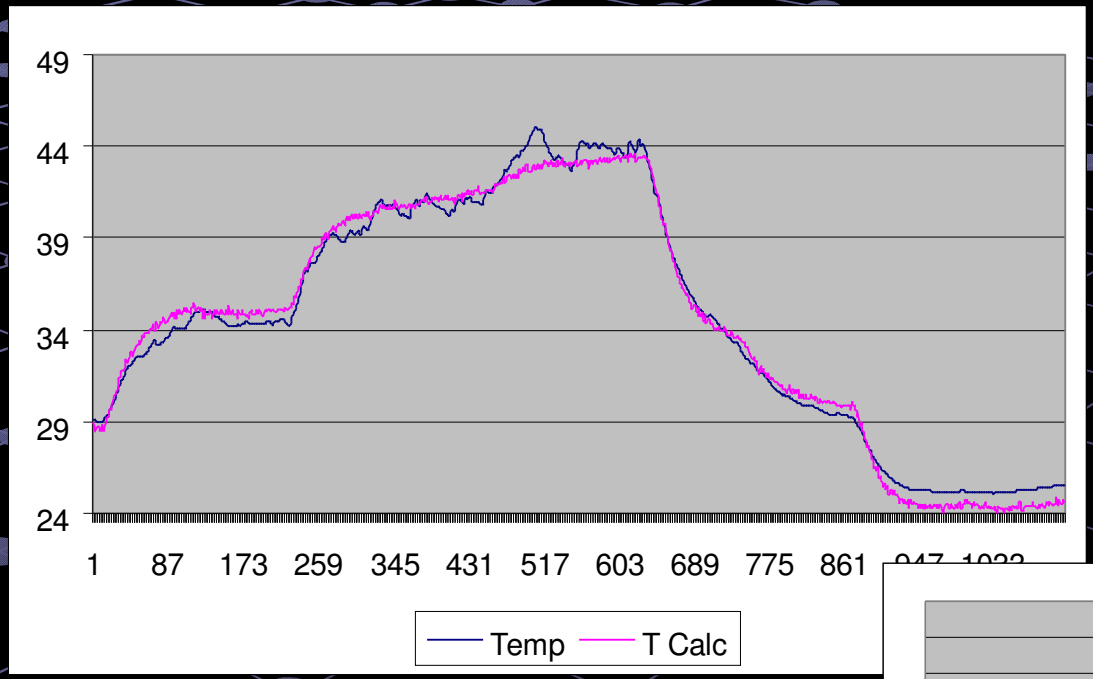
Frequência óptima
da amostra sólida:

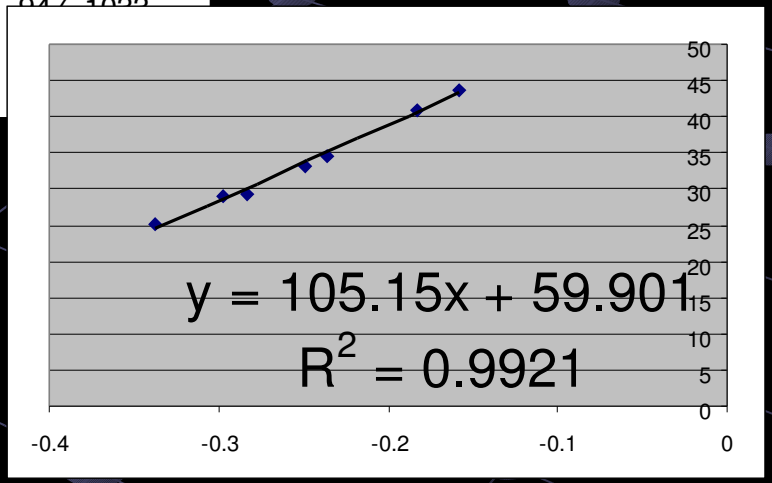
71 kHz

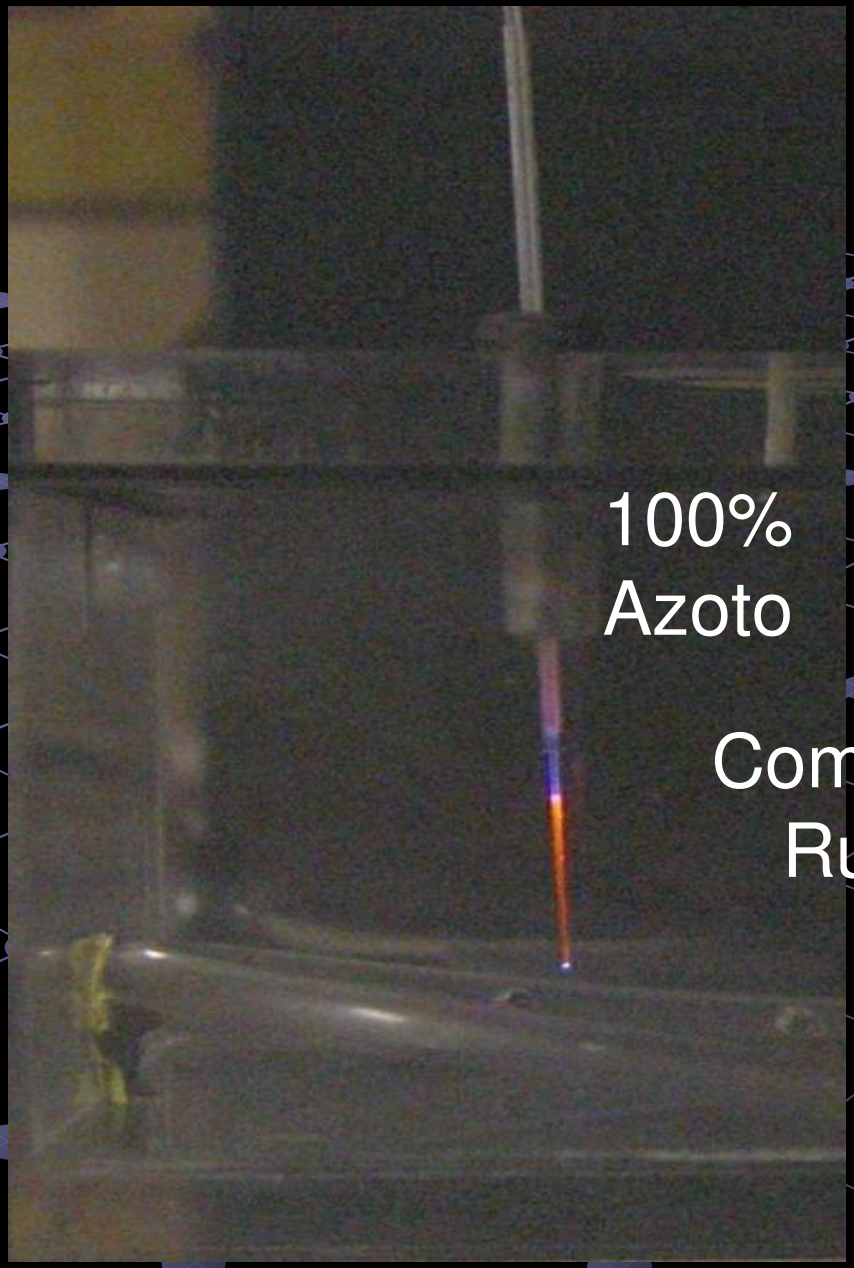
Frequência óptima
da amostra em pó:

58 kHz

Conclusão


49
44
39
34
29
24
1
87
173
259
345
431
517
603
689
775
861
Temp
T Calc


50
45
40
35
30
25
20
15
10
5
0
-0.4
-0.3
-0.2
-0.1
0
y = 105.15x + 59.901
R2 = 0.9921



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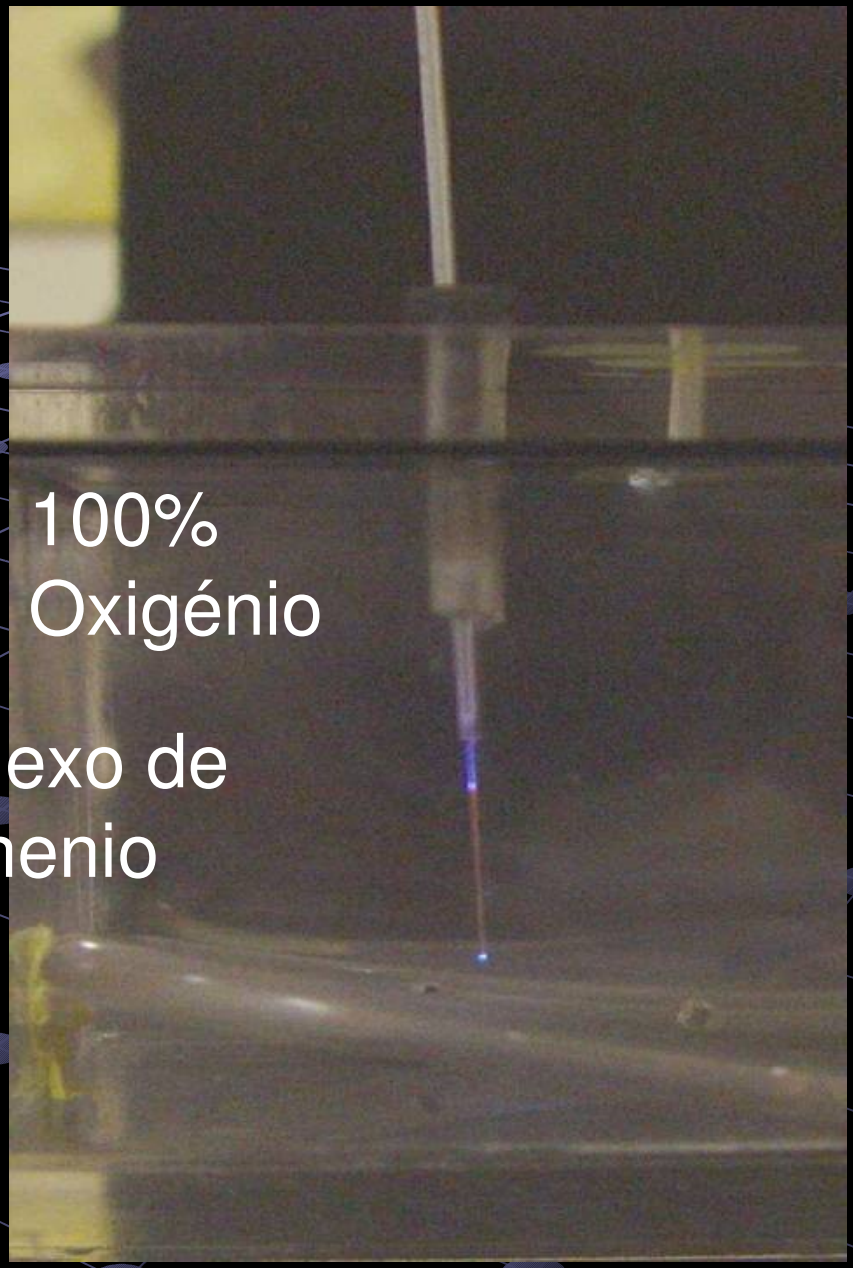
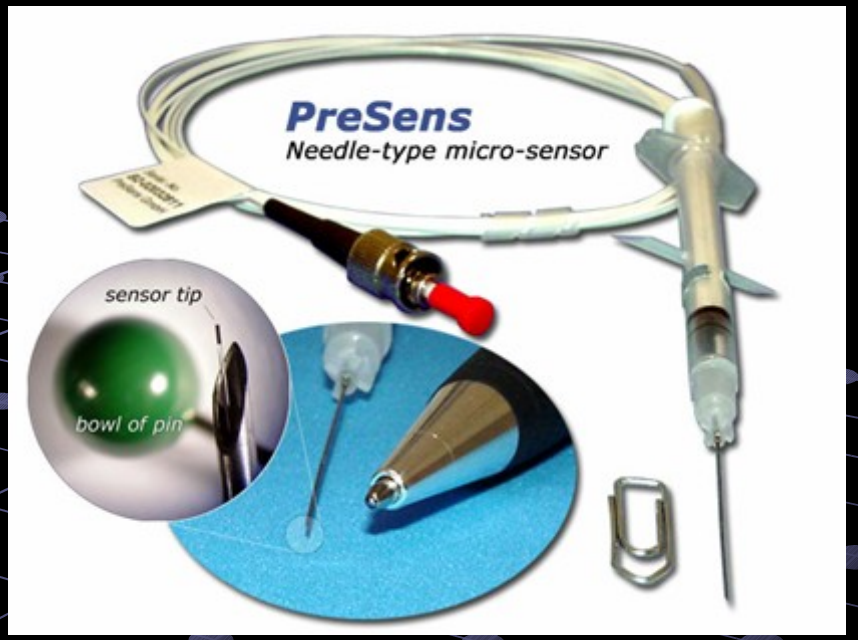
Azoto



100%
Oxigénio

Complexo de
Ruthenio

Sensor de Oxigénio FOXY™ da Ocean Optics



PreSens™ Needle-Type Housing (NTH) - pH Micro-Sensor.

Outras Utililizações

- Medicina
  - Medição de Temperatura sem contacto (não invasivo)
- Ambientes Críticos
  - Medição de substâncias em meios explosivos (sensíveis a fios eléctricos)
- Mapeamento de superfícies

Para finalizar ...