

STUDY OF THE HONEY GRANULATION DURING LOW HEATING CONDITIONS

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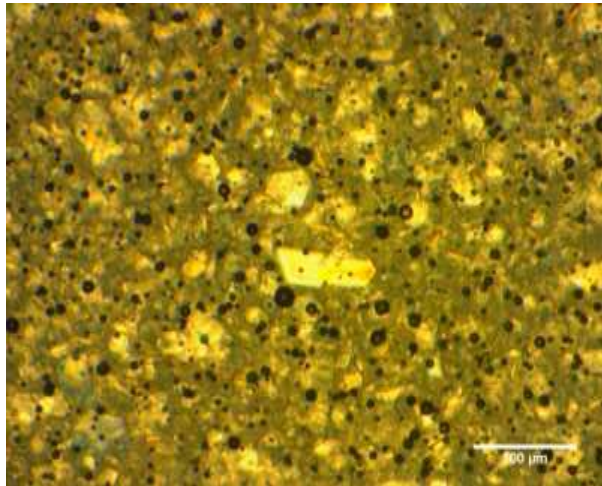
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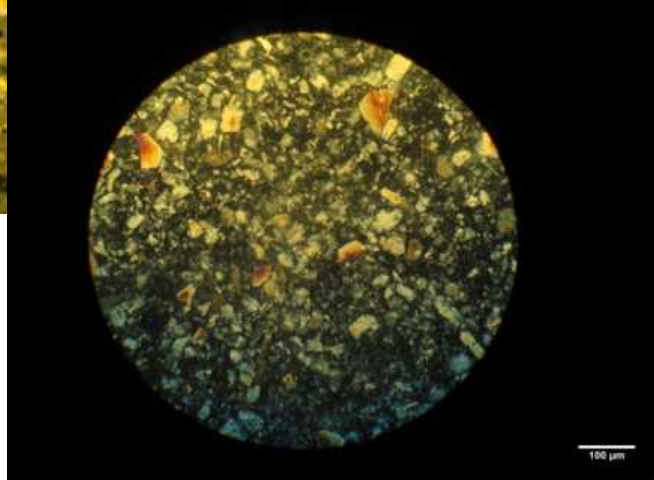
Kiev, 2 October 2013

Context of the study

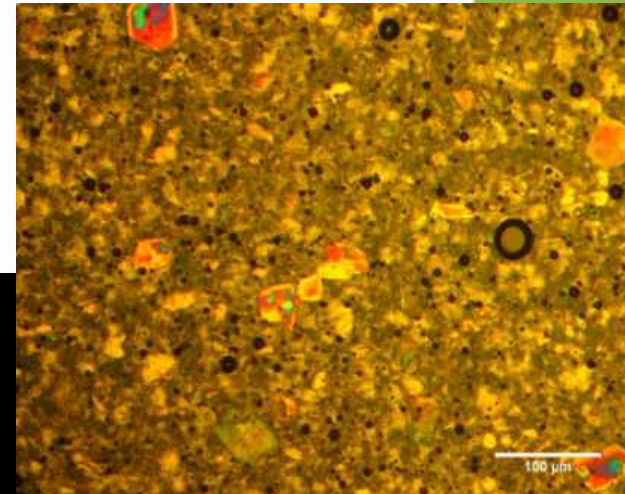
Granulation of honey : important information for the physical properties



Lime honey



Rape honey



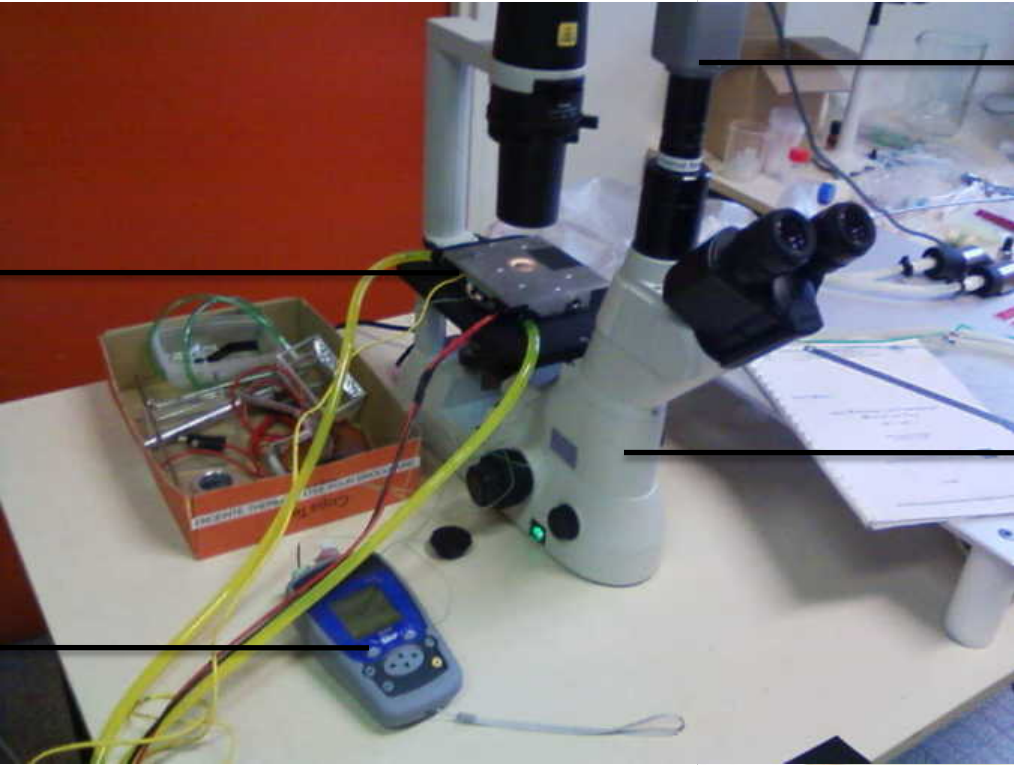
Sunflower honey

ISSUES

- Find new ways to study the cristallization of honey
- Characterisation of the granulation of different honeys



Materials and methods

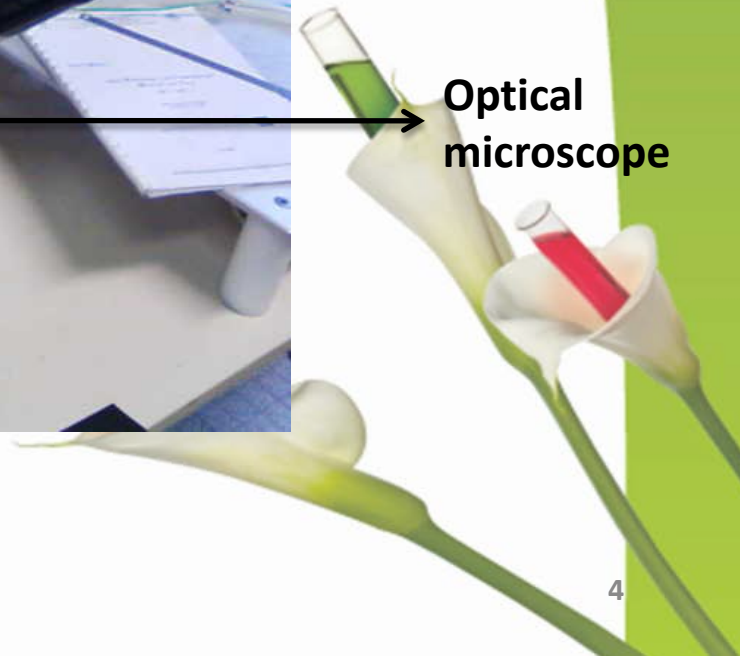


Camera

PeltierModule

Optical microscope

Temperature sensor





Peltier control ←

→ Cooling control

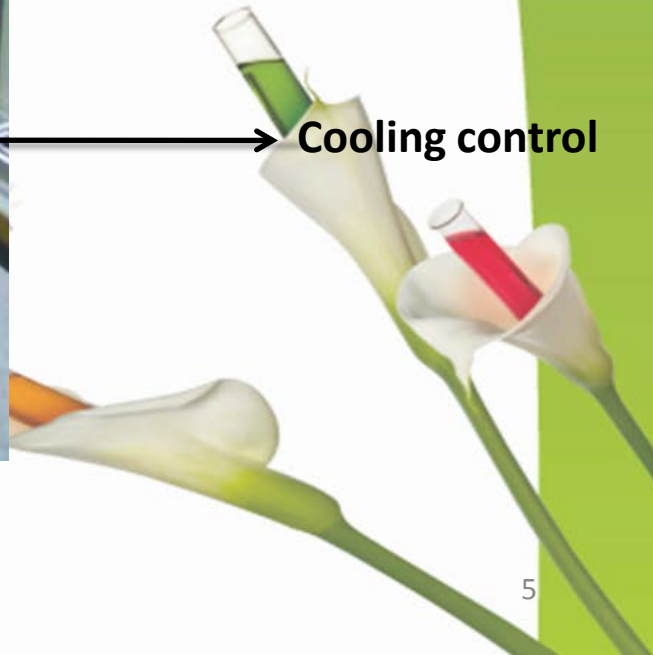
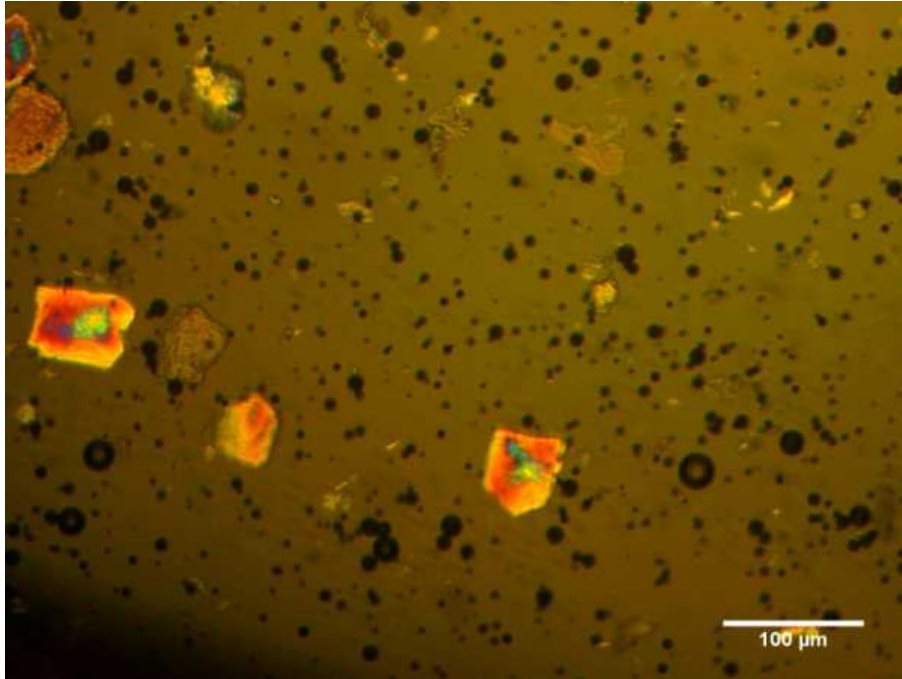
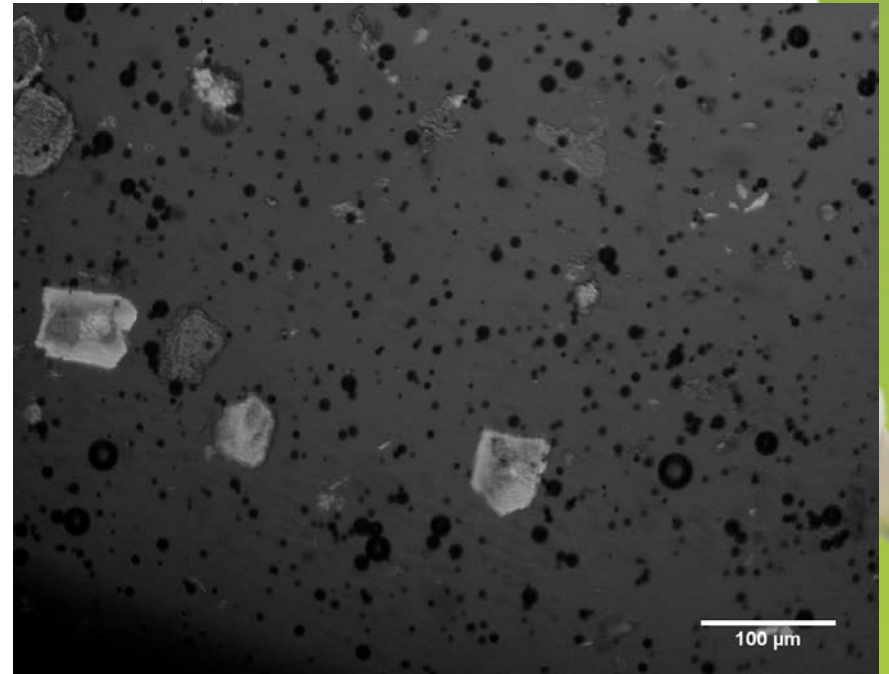


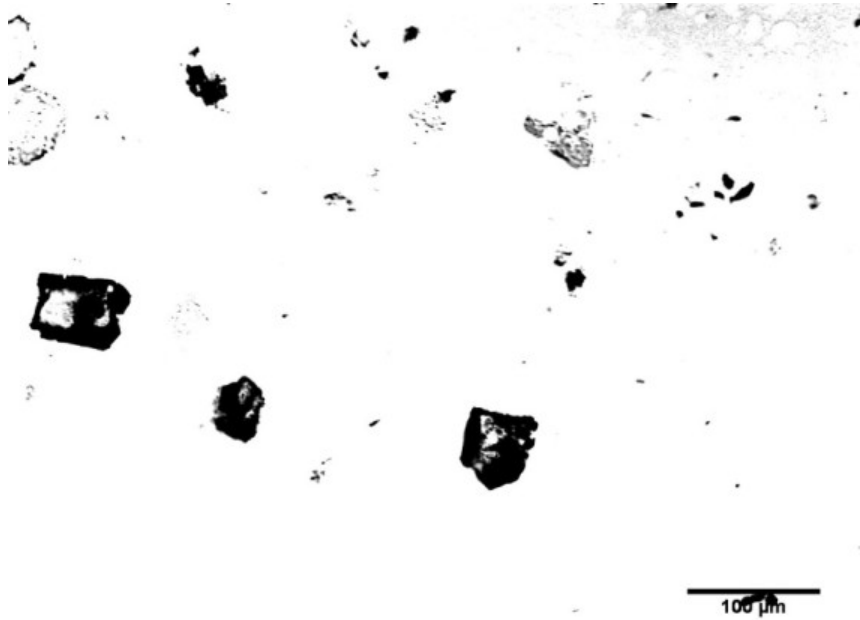
Image processing

By ImageJ® software



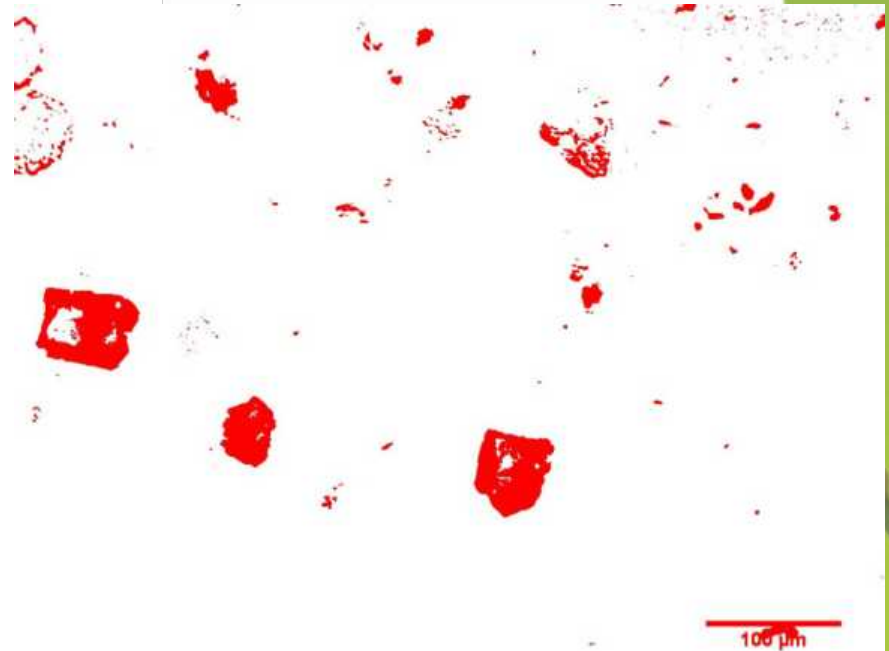
1- Grayscale





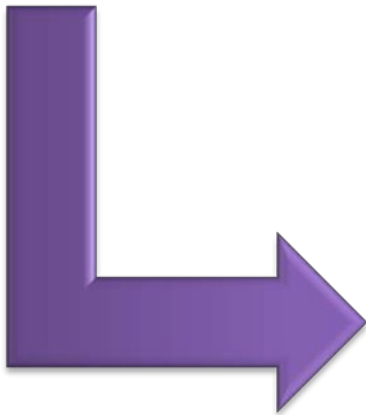
**Adjust
Brightness & Contrast**

**Adjust
Threshold**

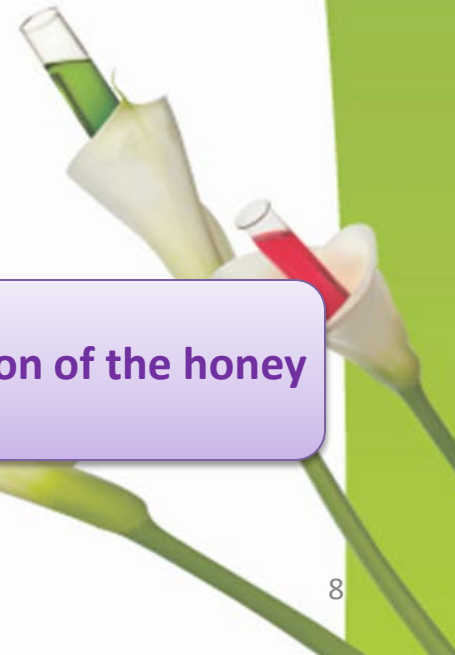


Obtention:

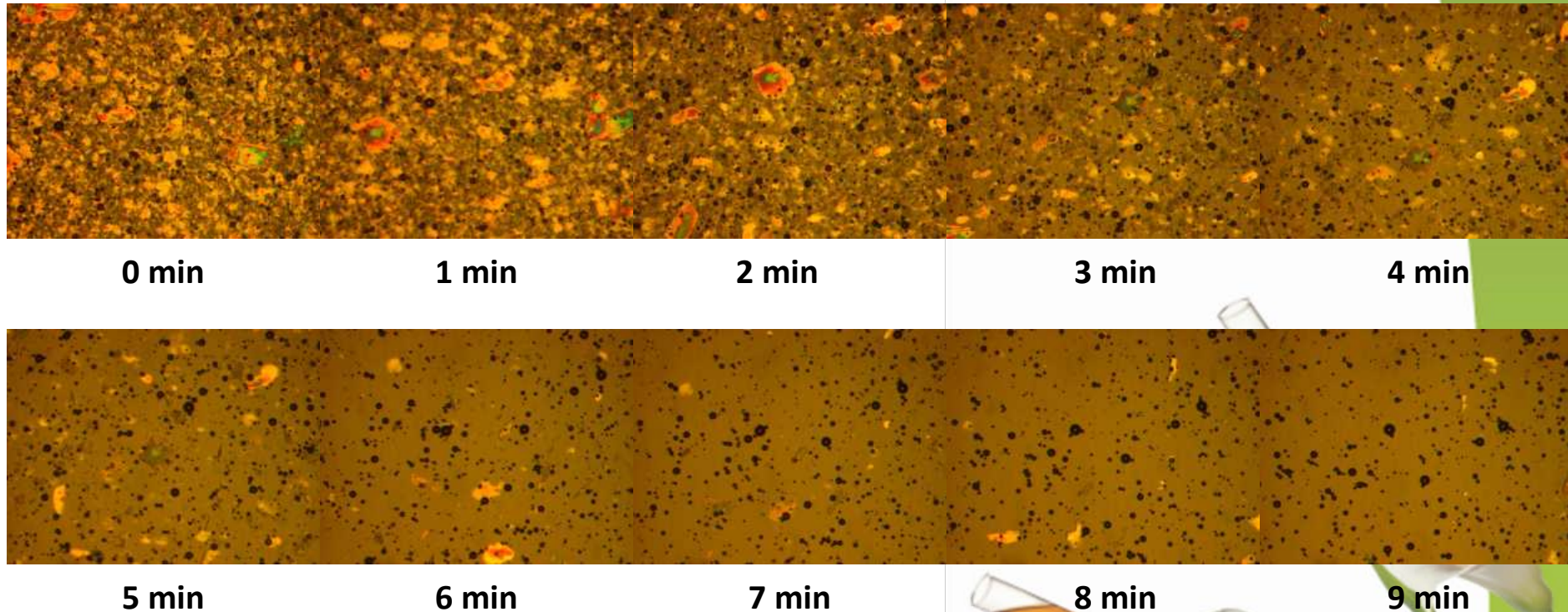
- Number of crystals
- Size of crystals (surface, diameter...)
- Total surface



Representation of the crystallization of the honey



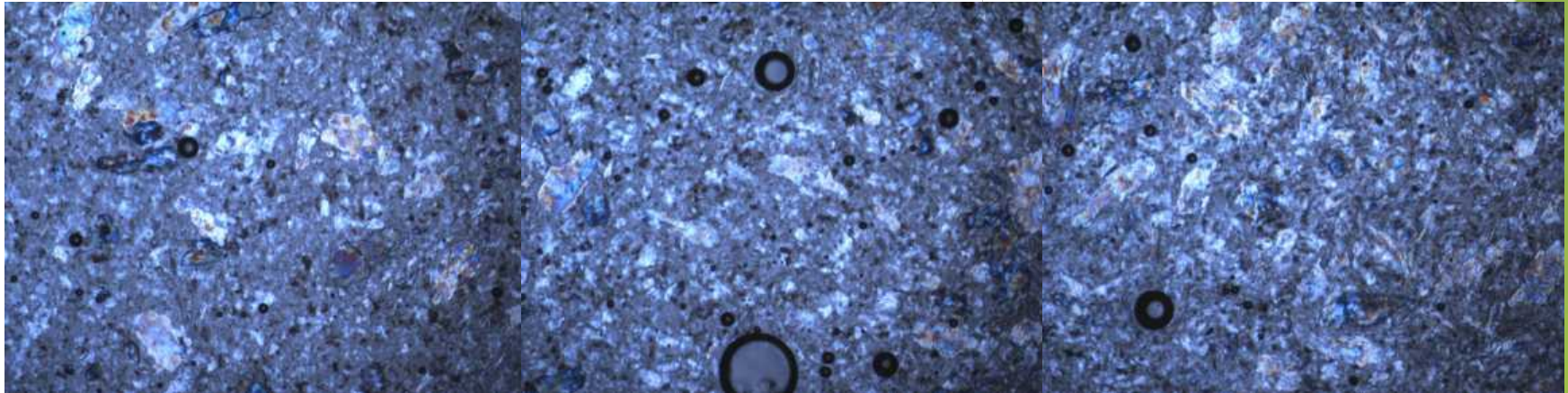
Visualisation of the crystals melting



Sunflower honey, $T=60^{\circ}\text{C}$

Accuracy of the method

1 Sunflower honey, 3 samples



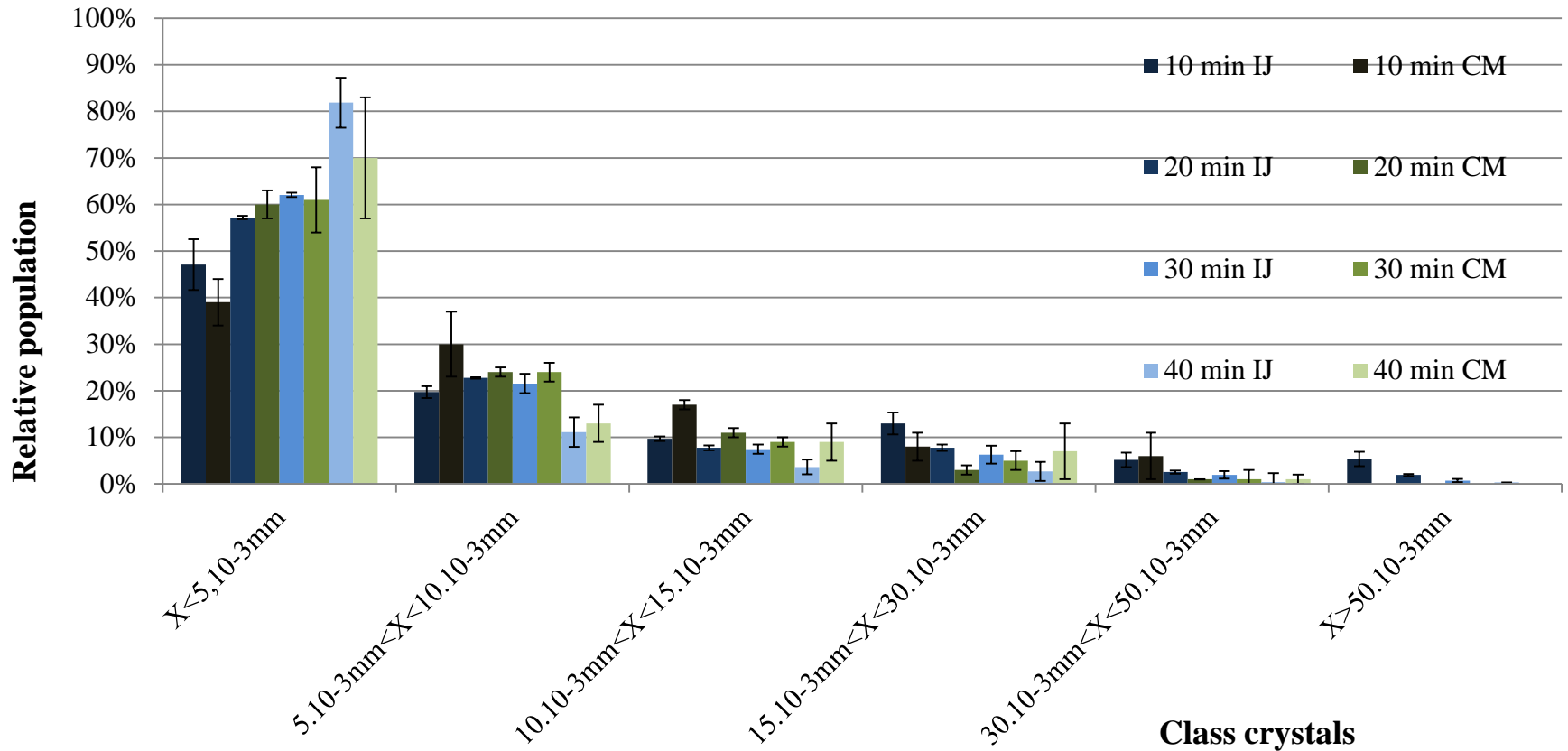
Sample 1

Sample 2

Sample 3

Accuracy between the 3 samples = 7.7%

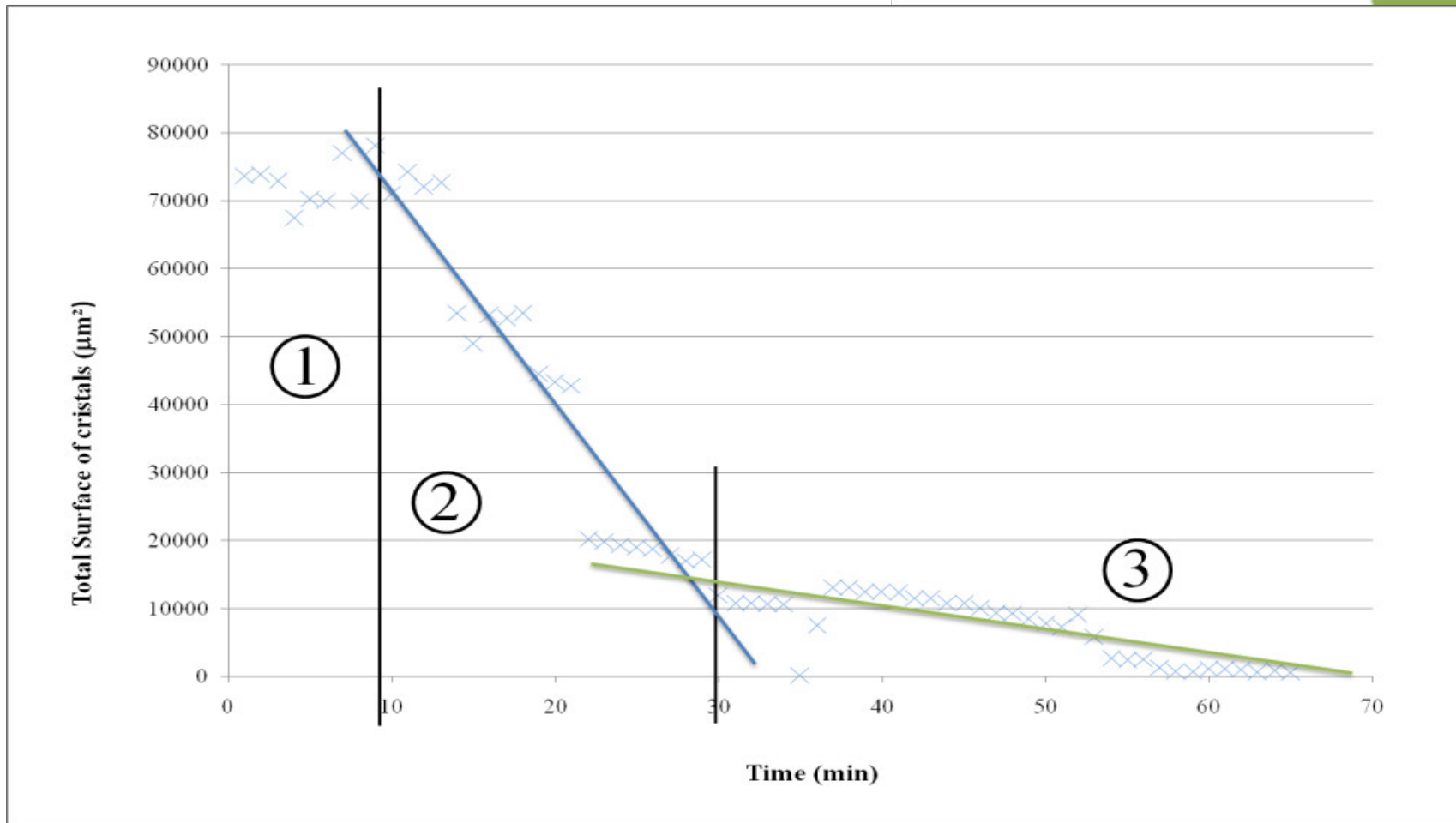
MANUAL / AUTOMATIC
COUNT



IJ: Automatical Count
Cm: Manual Count

Sunflower $T = 60^\circ\text{C}$

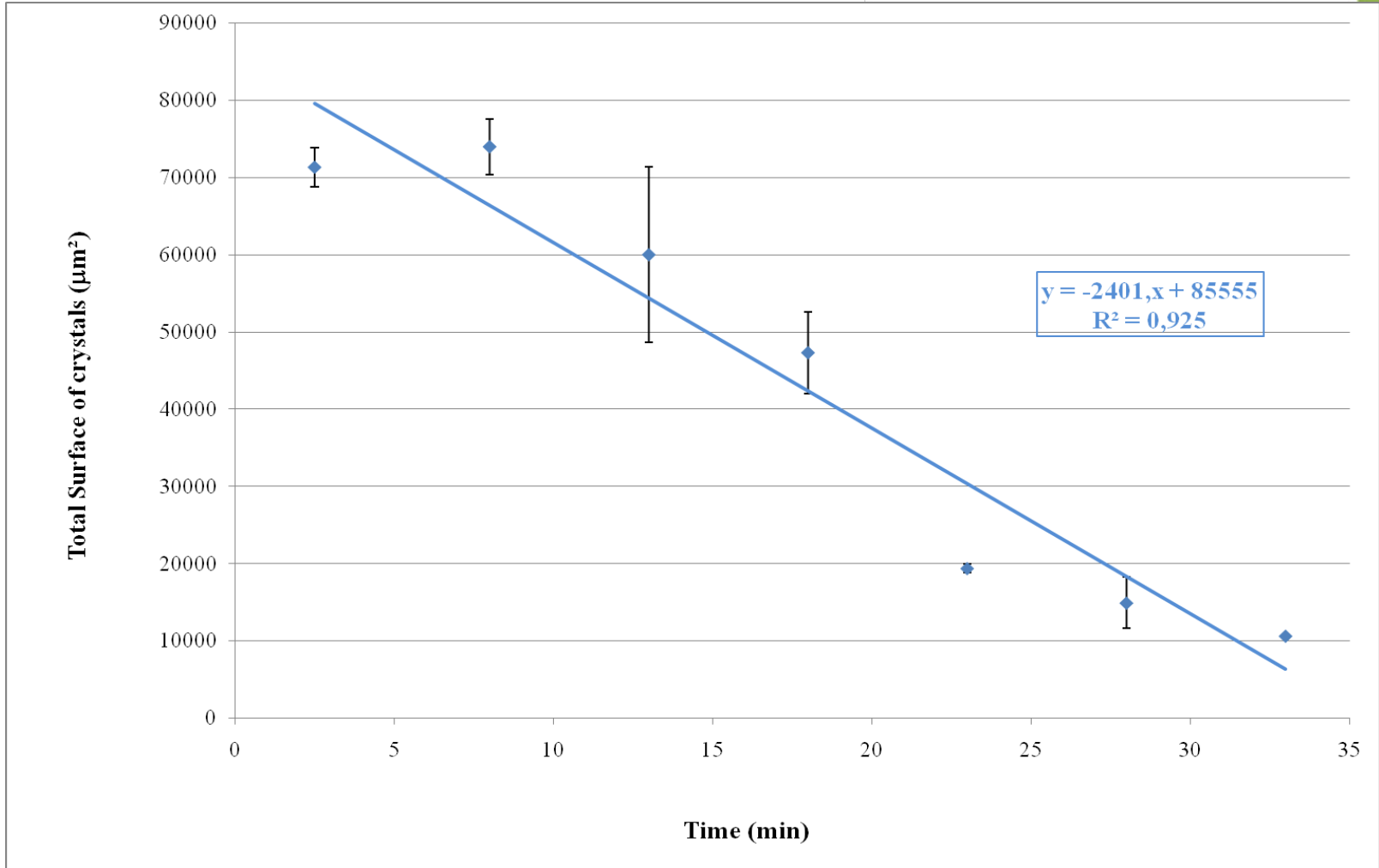
Melting kinetics (sunflower honey 50°C)



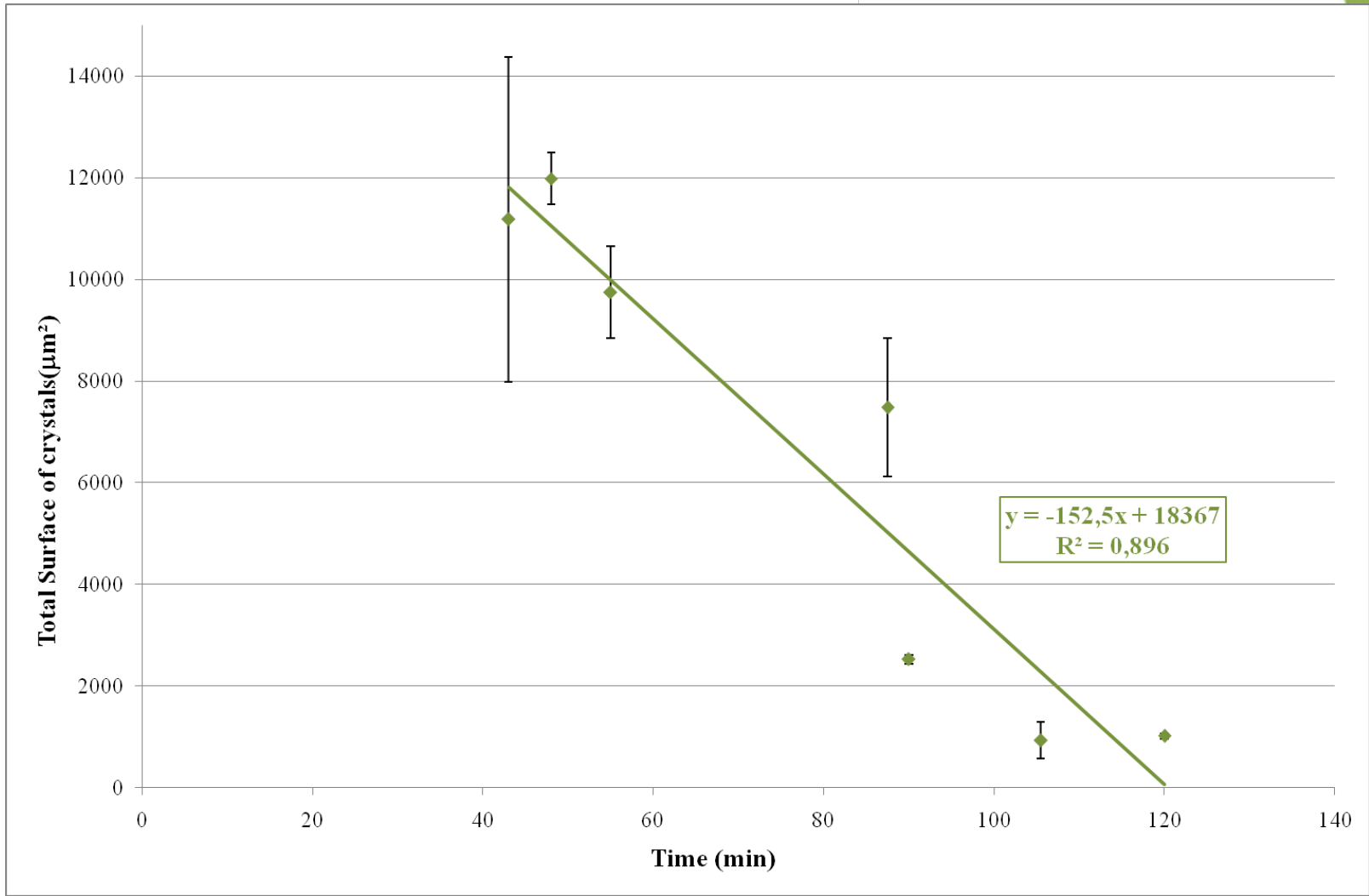
3 characteristic phases: →

- 1- Raised of temperature
- 2- Rapid melting of crystals
- 3- Slow melting crystals

Analysis of Phase 2



Analysis of Phase 3

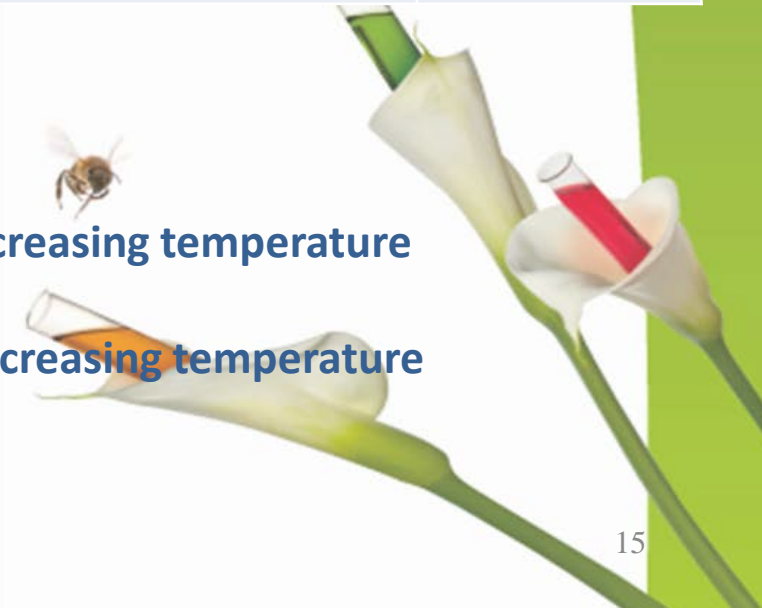


Summary of the results for the sunflower honey

Temperature (°C)	Phase 2		Phase 3	
	Melting kinetick ($\mu\text{m}^2.\text{min}^{-1}$)	R ²	Melting kinetick ($\mu\text{m}^2.\text{min}^{-1}$)	R ²
50	-2433	0.93	-153	0.90
55	-3129	0.67	-50	0.80
60	-10918	0.83	-38	0.83

NOTES:

- Melting speeds increase during phase 2 with increasing temperature
- Melting speeds decrease during phase 3 with increasing temperature



CONCLUSION

- ✓ Validation of the characterization methode
- ✓ Highlighted of the behaviour of melting of different honeys





Thank you for your attention...

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