

# DYNHOM project state-of-the-art

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UNIO Vienna 17th of November 2016



# DYNHOM project

- **Main question:** What is the **Signature** of a homeopathic dynamized medicine?
- **Secondary questions:** Homeopathic Medicines **Stability** (expiring date – preservation); Best Manufacturing Methodology (**GPP** & **GMP**).



## Signature ?

**Ink added to paper but  
significance is not coming  
from the material?**



## Already published :

- ✓ Modulation of genes' activity (Epigenetic reaction)
- ✓ Discriminant signal between remedies (NMR)
- ✓ Persistence of stock material in high dynamizations
- ✓ Quality requirements (European Pharmacopoeias)
- ✓ Clinical surveys, clinical cases
- ✓ Provings, Materia medica
  
- ✓ **AVOGADRO ?**



## A comprehensive approach

- ✓ **Nano particles search**
- ✓ **Solvent (water) behaviour**
- ✓ **Electrons behaviour**



# The Golden Team

- Teams **logistic**
  - Manufacture GPP: PhD Martine Goyens
  - Fund raising, Secretarial Office, Management, Coordination, publications: MD Philippe Devos.
- Teams **measurements**
  - UHPLC-UV (plants) and lyophilisations : Prof. PhD Joëlle Quetin-Leclercq. Dean UCL-Faculty of Pharmacy.
  - SP-ICP-MS/TEM (metals): PhD Nadia Waegeneers. Veterinary and Agrochemical Research Centre + Sysmex.
  - DLS/ZP/NTA/SEM-EDX: Sysmex company Holland.
  - NMR: Prof. Luce Vander Elst. Mons University. Biomedical chemistry. Nanotechnology.
  - Electro-photonic analyse: Prof. Marc Henry. Strasbourg University. Molecular chemistry.





# Preparations GPP





## A comprehensive approach

### ✓ Nano particles search

✓ Solvent (water) behaviour

✓ Electrons behaviour

# SP-ICP-MS



- Cuprum metallicum.

- SP-ICP-MS/TEM (metals): Single Particle Inductively Coupled Plasma Mass Spectrometry-Transmission Electronic Microscopy. in 20cc of 4CH dynamized water solution maximum 0,02µg of cuprum would be expected and 0,2g of Lactose.
- Results in Cupr 4CH: In the solution, there is a **huge background signal but these particles are far too small to be detected by single particle ICP-MS**, the detection limit for copper particles is 45 nm (52 nm for Cu<sub>2</sub>O). Later on we did the same using a concentrate after lyophilisation of 200cc of solution with a similar outcome.

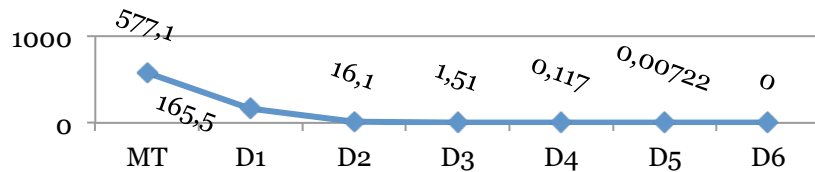
# HPLC-UV

- **Gelsemium sempervirens**

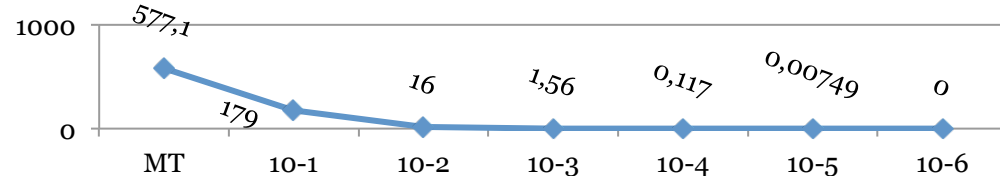
- HPLC-UV: High Performance Liquid Chromatography using UV detector. Dynamized versus simply diluted.



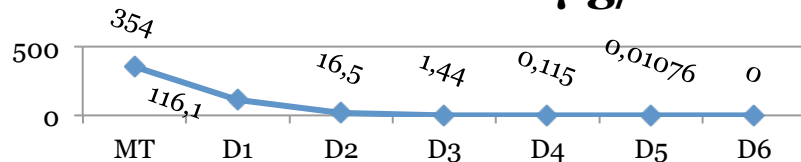
**Sempervirine mean  $\mu\text{g/ml}$**



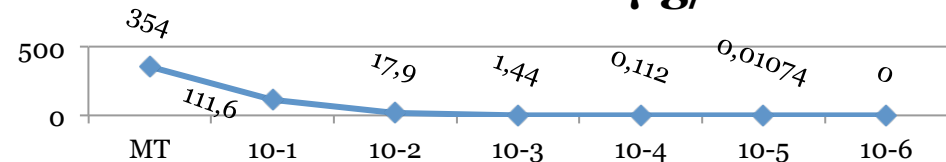
**Sempervirine mean  $\mu\text{g/ml}$**



**Gelsemine mean  $\mu\text{g/ml}$**



**Gelsemine mean  $\mu\text{g/ml}$**



- No difference with or without dynamization / Quantification limit = D6



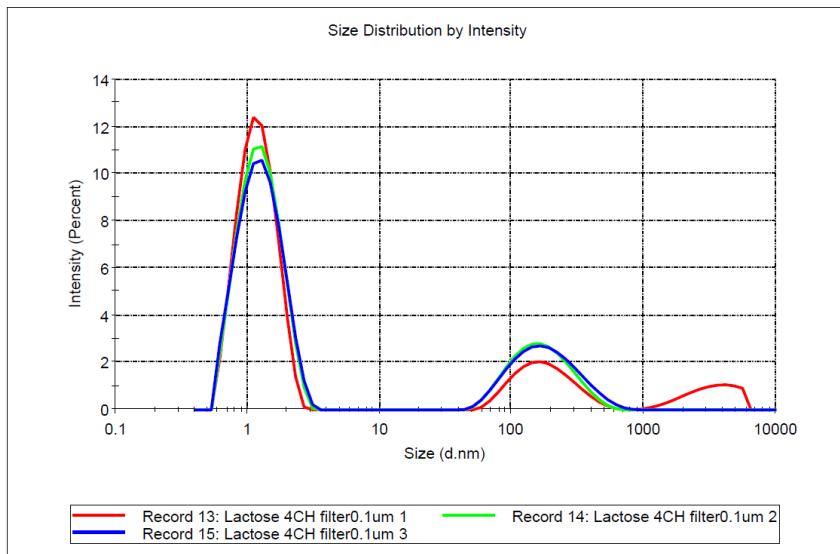
# DLS : Dynamic Light Scattering

- Cuprum metallicum 4CH.

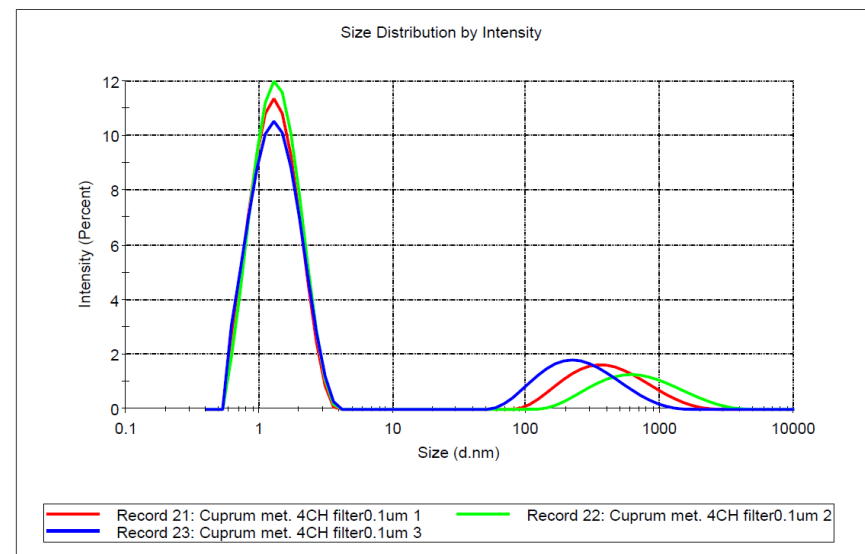


Results

## Lactose



## Cuprum



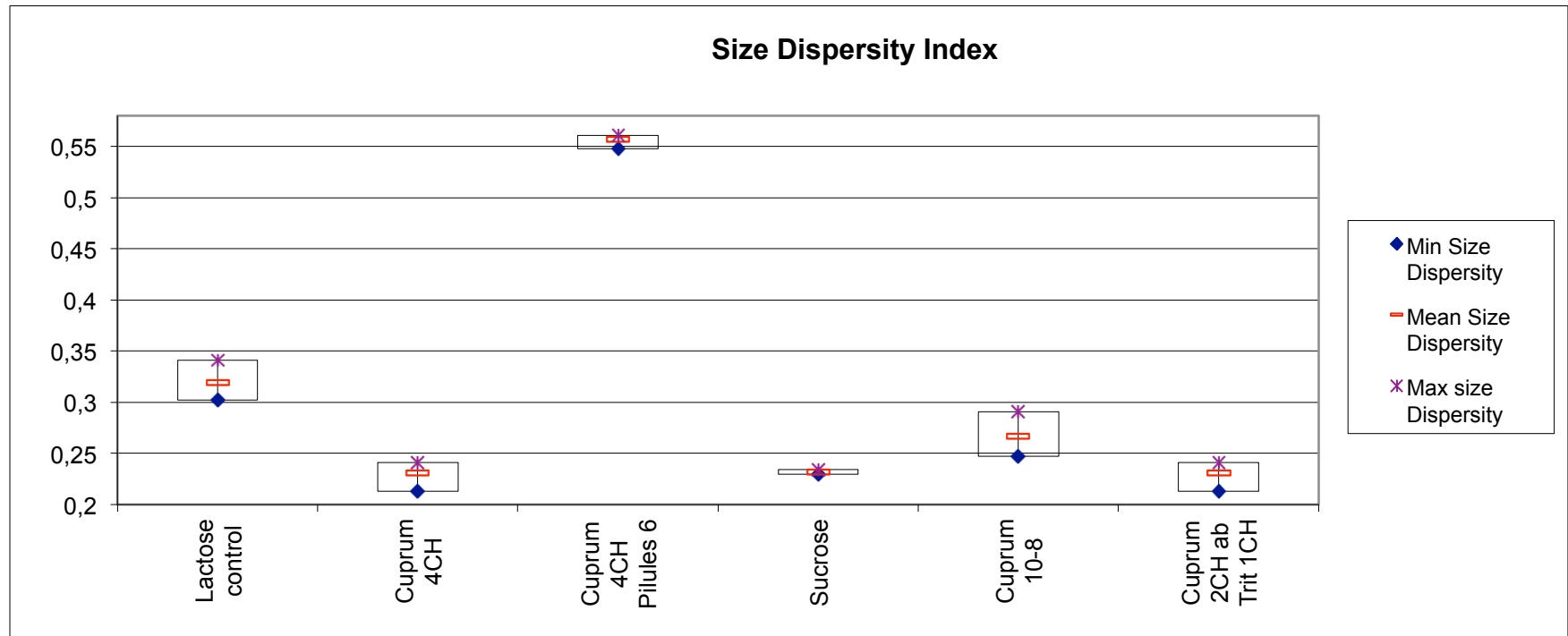


# DLS : Dynamic Light Scattering

- Cuprum metallicum 4CH.



*The PDI (Poly Dispersity Index) of DLS measurements shows that measurements are valid ( $>0,7$  would indicate a too broad size distribution). The particles size distribution in Cuprum 4CH is more homogeneous than in the lactose control.*



## DLS : Dynamic Light Scattering

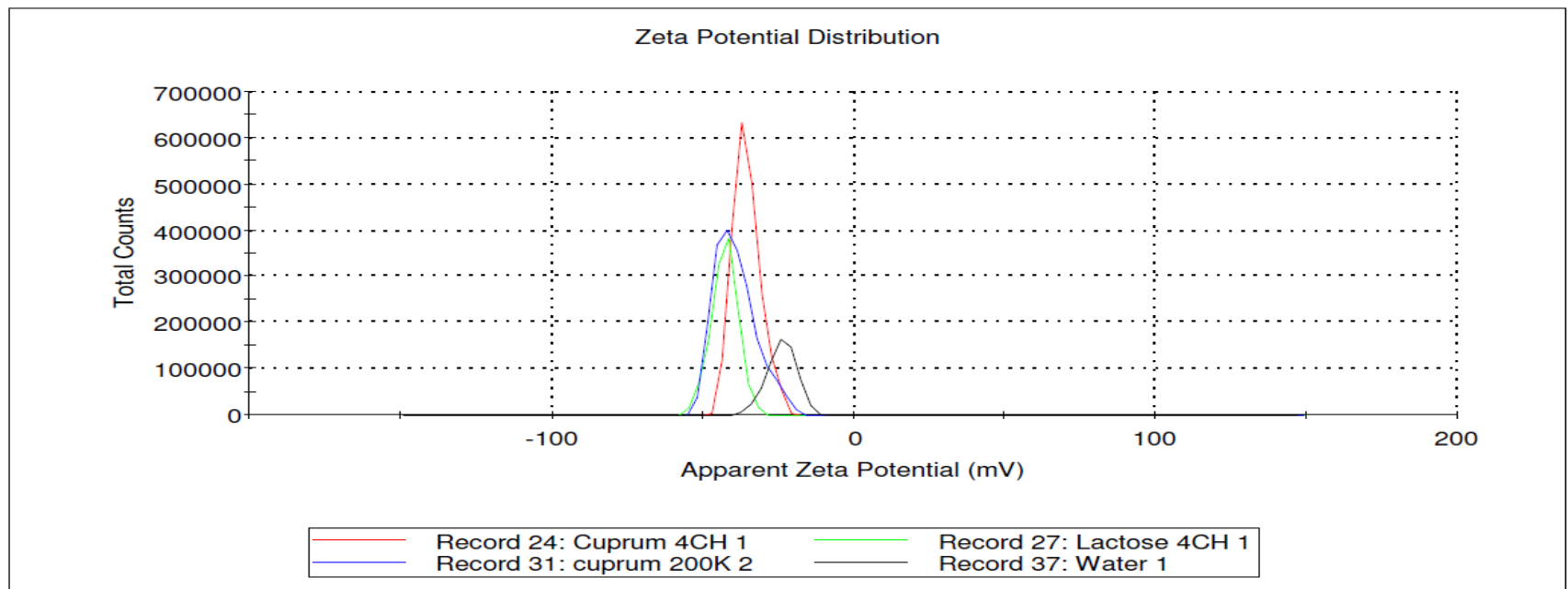
- Cuprum metallicum.
- **RESULTS conclusions:** Same size of small nano-particles in cuprum 4CH and lactose 4CH, **between (0,8nm/1,95nm)**. The presence of the expected 0,02µg of copper in 20cc cuprum metallicum 4CH dynamization is not yet confirmed. These nano particles are **not detectable with DLS above 4CH**. Greater heterogeneity of particles in lactose 4CH.



# ZP : Zeta-Potential

- Cuprum metallicum.

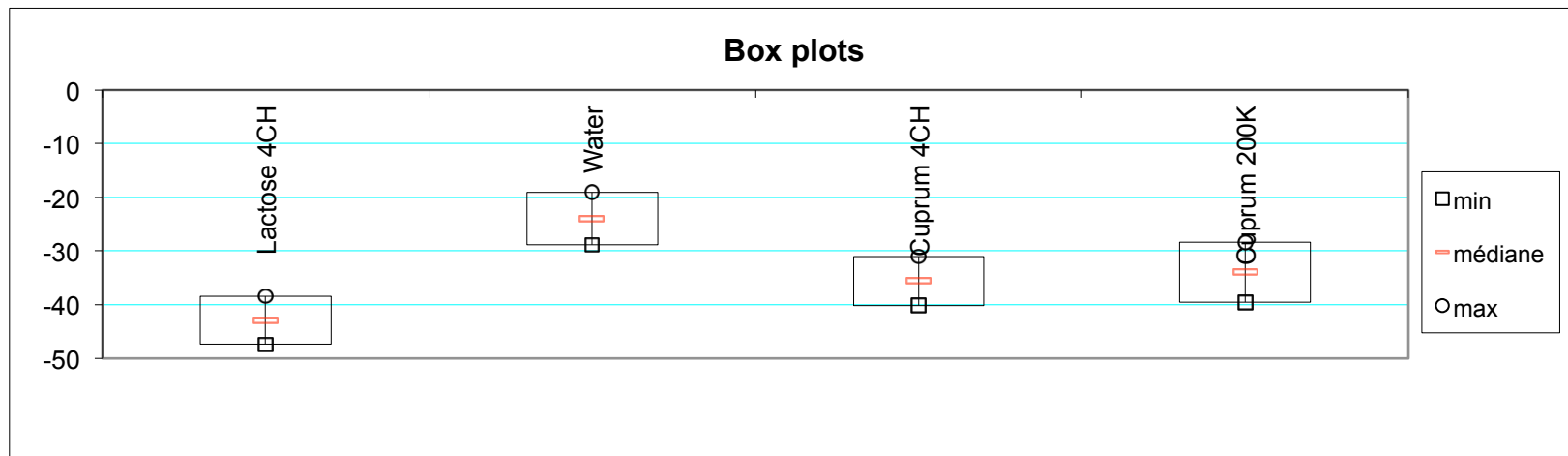
- Zeta potential is a method for the measurement of the electrostatic potential at the electrical double layer surrounding a nanoparticle in solution.
- Zeta potential Cuprum 4CH median value -35,6mV, lactose -42,9mV, Water -24mV, Cuprum 200K -39,3mV. Note also that the total counts is significant higher and valid for Cuprum 4CH



# ZP : Zeta-Potential

- Cuprum metallicum.

- In opposition to DLS, if the preparation is filtered (filter 0,1 $\mu$ ) this signal became unstable and irrelevant. This means that other detected larger particles (see further) play a role in stabilisation of this information.
- With zeta potential the mean difference between water control and other samples is significant and possible between Cuprum 4CH and lactose control.



## **NTA : Nanoparticle Tracking Analysis**

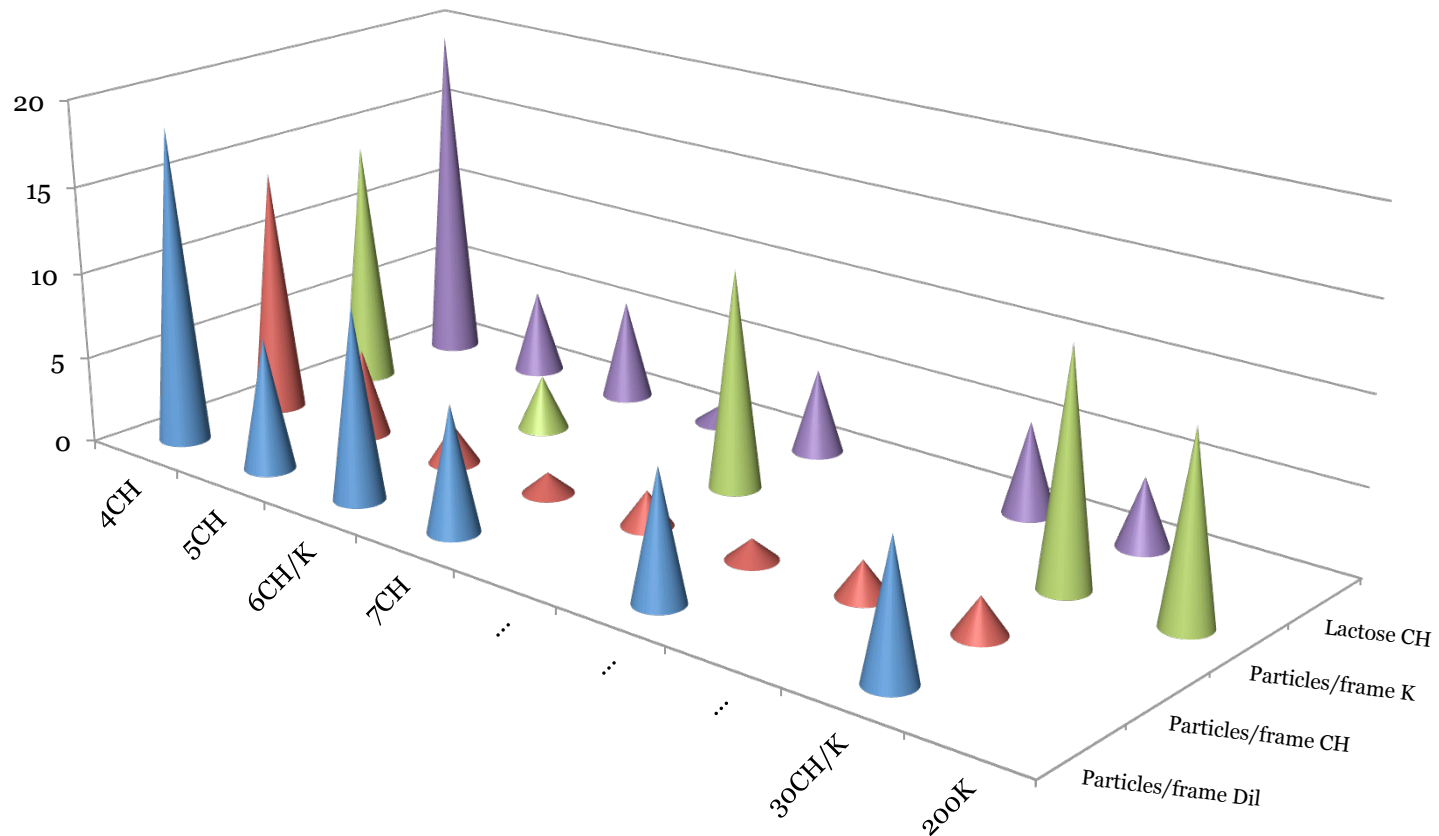
- Cuprum /Gelsemium.

### **Nanosight:**

- This technology is limited to particles above 20nm, we could see a significant amount of particles only in unfiltered samples.
- No particles in pure undynamised water control.

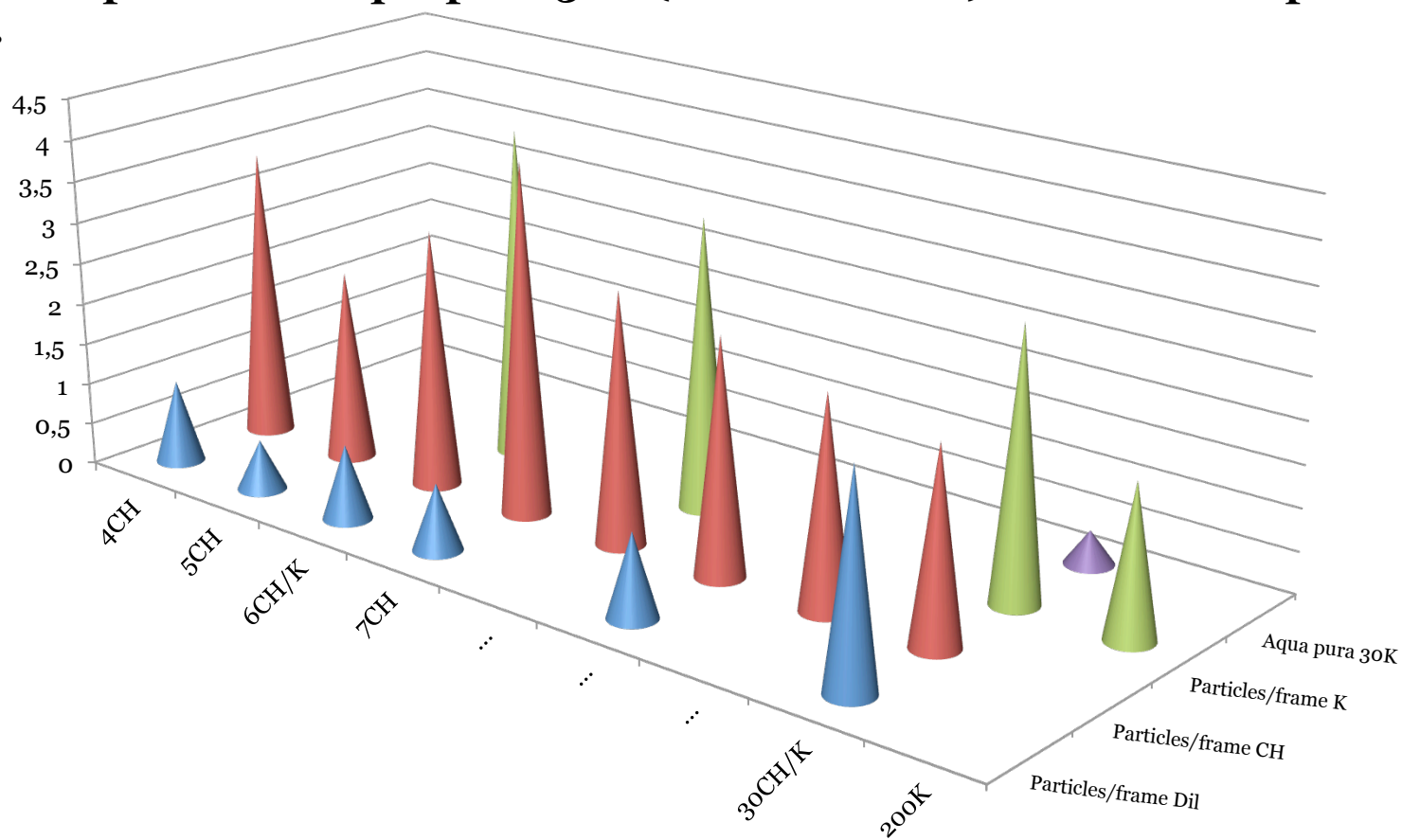


**CUPRUM: Presence of particles above 20nm in successive dynamisation (Particules/frame). Blue are particles in simply diluted copper, red are CH potencies, green are K potencies and purple are dynamized lactose. “...” are extrapolated values.**



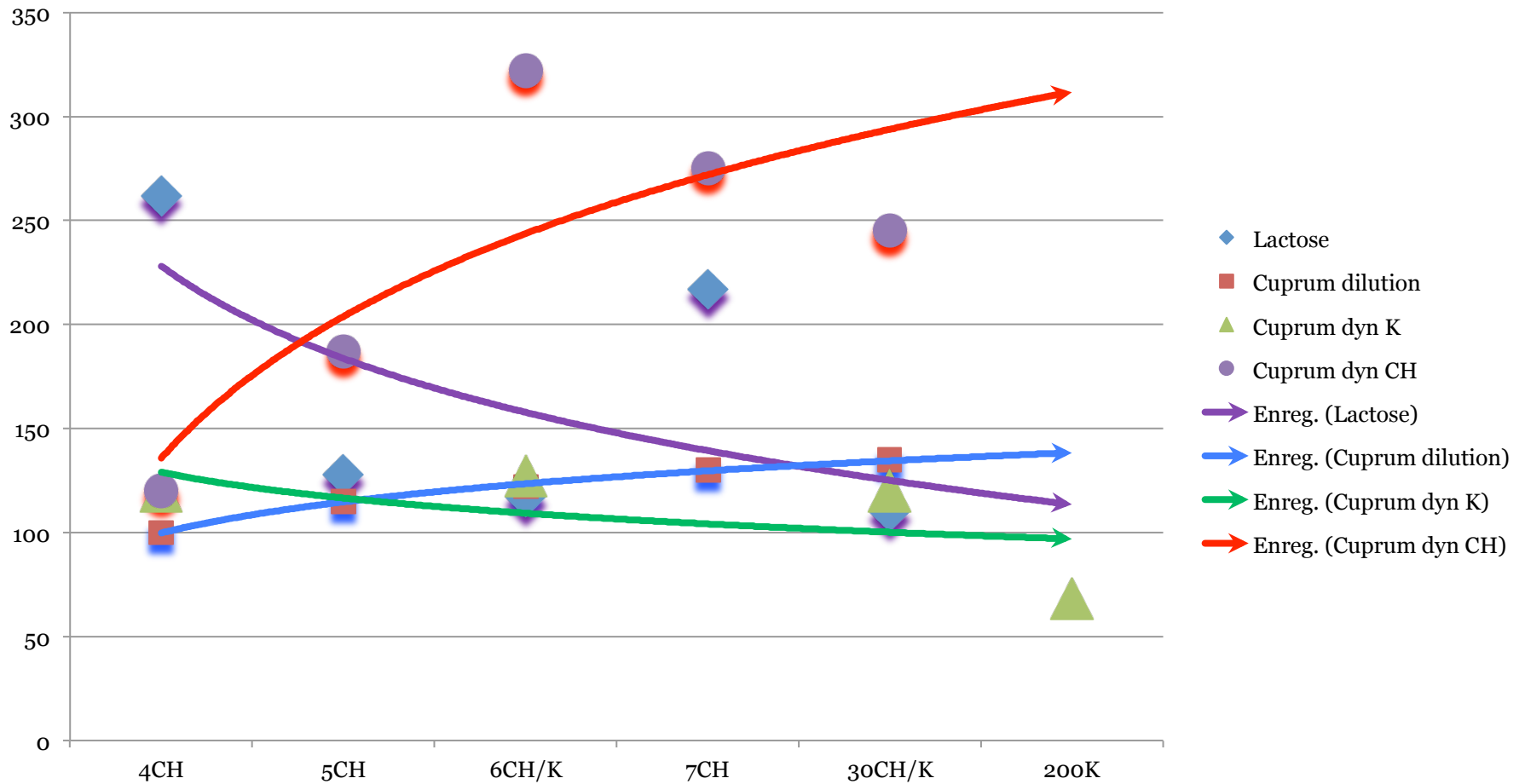


**GELSEMIUM: Presence of particles above 20nm in successive dynamisation (Particules/frame). Blue are particles in simple diluted samples, red are CH potencies, green are particles in K potencies, purple are particles in potentized aqua pura 30K (PET container). “...” are extrapolated values.**



# Mean particles sizes in nanometers

(Cuprum metallicum and controls).



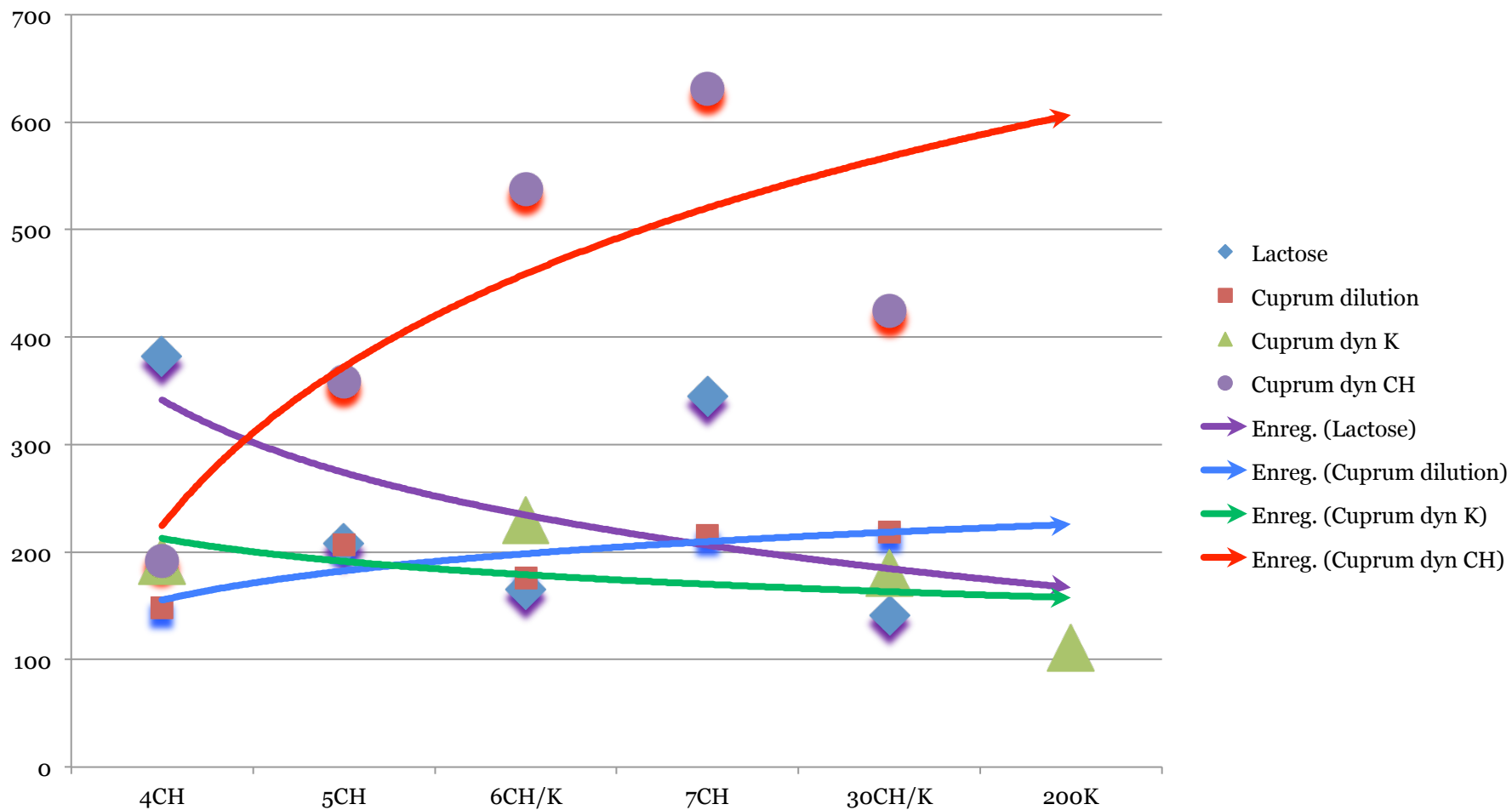
# Mean particles sizes in nanometers.

(Gelsemium and controls).

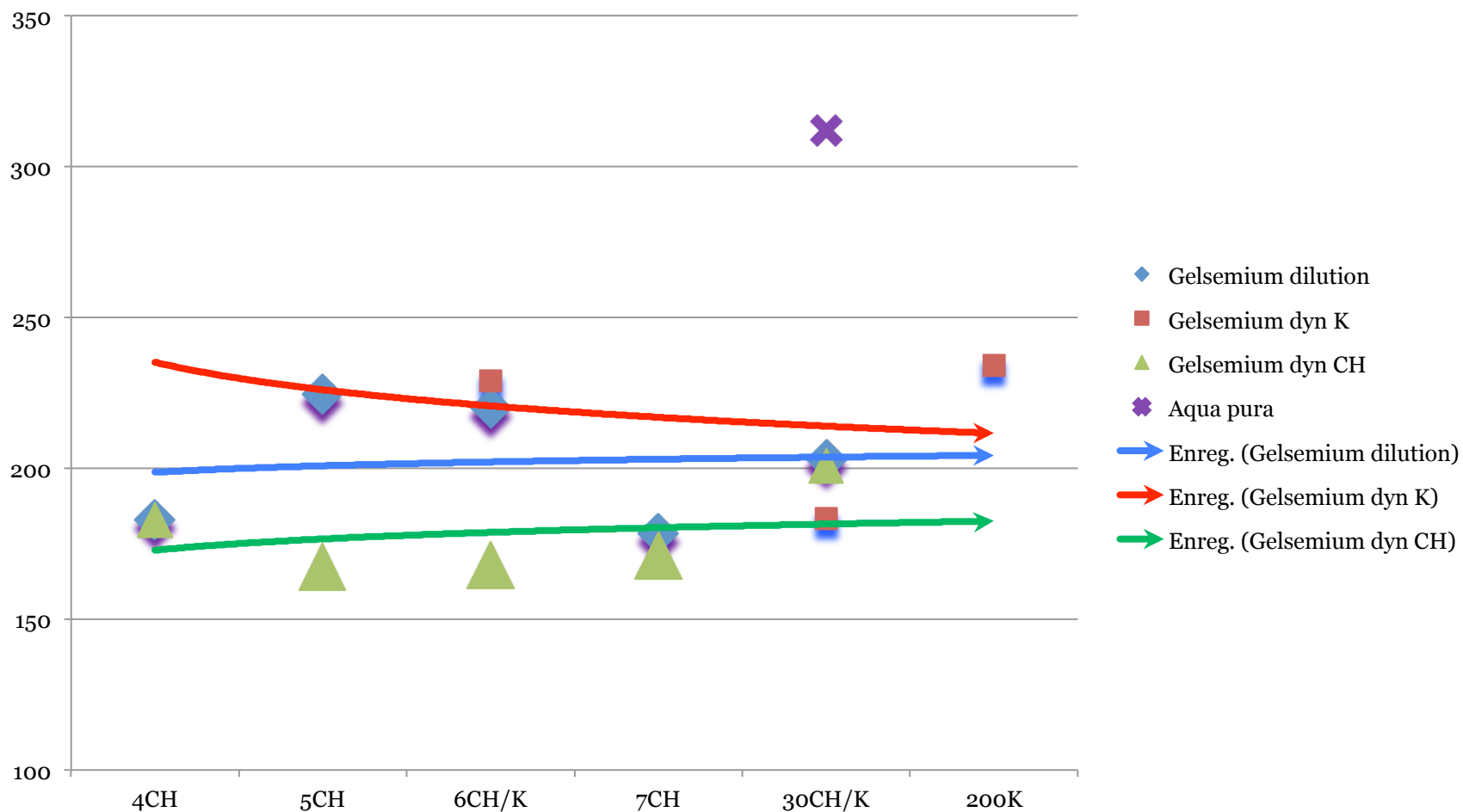


# Particules sizes distribution (D90) in nanometers.

## (Cuprum metallicum)



# Particules sizes distribution (D90) in nanometers. (Gelsemium)



## NTA : Nanoparticle Tracking Analysis

- Conclusions.
- The presence of particles even in highest dynamisation stay in a relatively stable concentration.
- **The particles sizes evolution for potentised Cuprum metallicum can clearly be differentiated from the two control groups.** The sizes and the dispersion of the particles sizes is growing only in CH potentized Cuprum.
- **For simply diluted samples of Gelsemium the quantity of particles is significantly lower than when a dynamisations proces has been invloved.** The particles sizes and dispersion cannot clearly be differentiated between groups even if it is smallest for CH dynamisations (size just above 100nm).







## A comprehensive approach

### ✓ Nano particles search:

**are these particles specific for the remedy?**

- ✓ Solvent (water) behaviour

- ✓ Electrons behaviour

# SEM/EDX

- Cuprum metallicum.

**SEM/EDX = Scanning Electron Microscopy  
with X-ray microanalysis.**

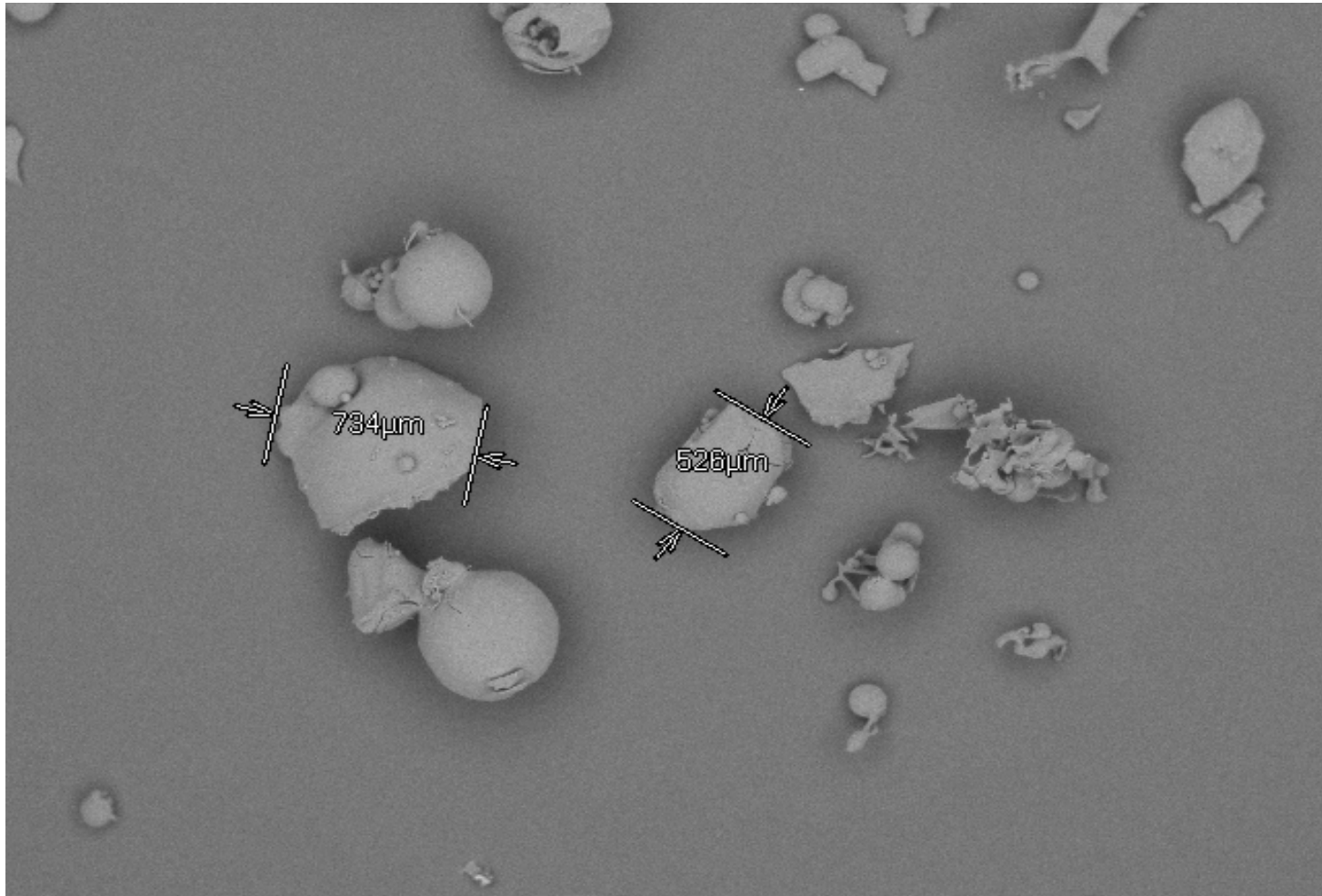
**Starting from 400cc (20 x 20cc 4CH samples),  
lyophilized (concentrated) we are able to identify  
these particles. 200cc of 200K and 30CH, contains  
also particles !**



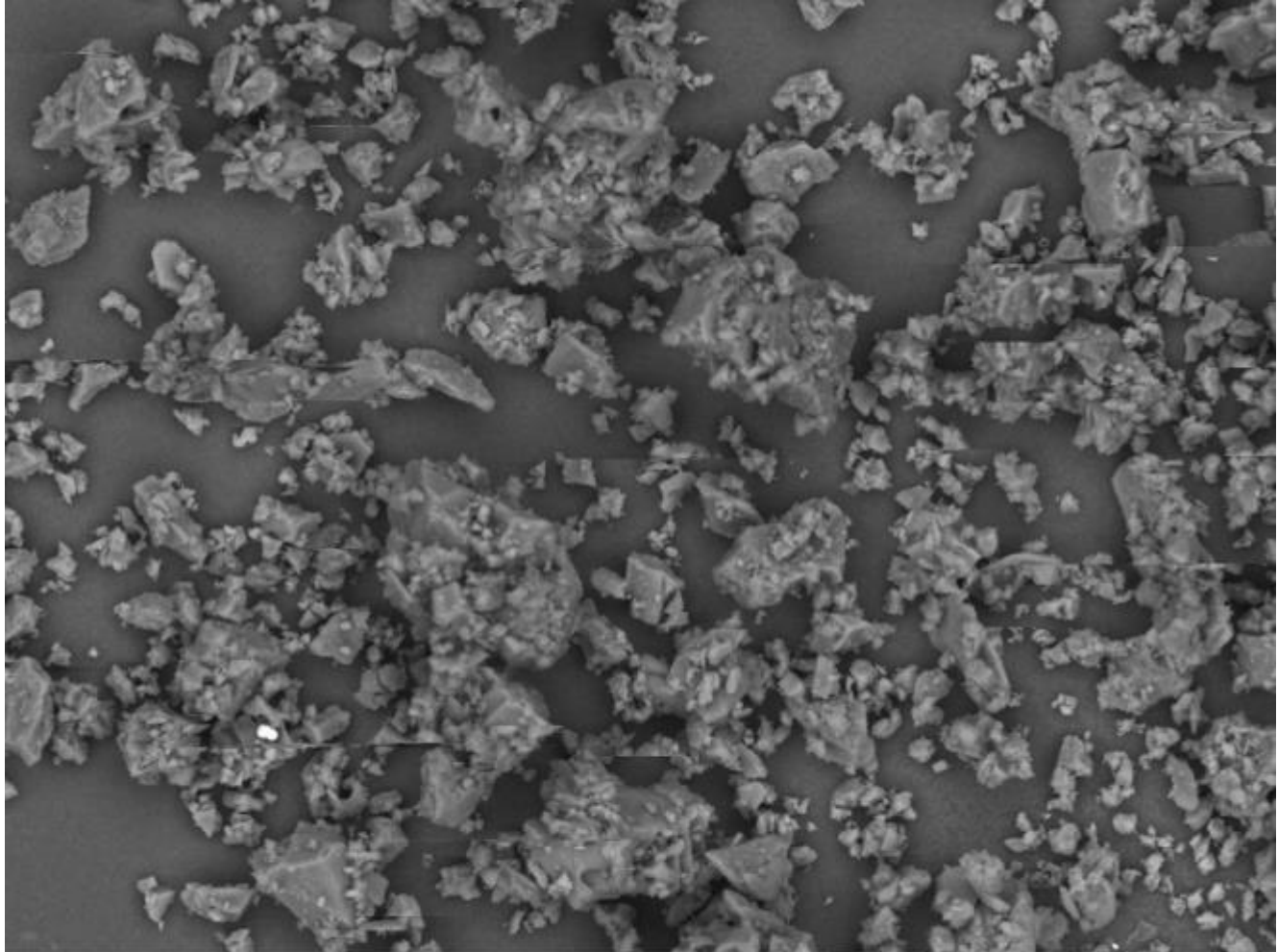
## Obtained dry lyophilized material

	Cu /g	lactose/g	Incertitude/g	Dry material/g
1 CH	0.01	0.99	0	
2 CH	0.0001	0.9999	$3 \times 10^{-9}$	
3 CH	0.000001	0.999999	$3 \times 10^{-9}$	
4CH aqua	$\pm 10^{-8}$	$\pm 0,01$	$3 \times 10^{-9}$	<b>10mg (=expected)</b>
5CH aqua	$10^{-10}$	$10^{-4}$	$3 \times 10^{-9}$	
6CH aqua	$10^{-12}$	$10^{-6}$	$3 \times 10^{-9}$	
7CH aqua	$10^{-14}$	$10^{-8}$	$3 \times 10^{-9}$	
8CH aqua	$10^{-16}$	$10^{-10}$	$3 \times 10^{-9}$	
9CH aqua	$10^{-18}$	$10^{-12}$	$3 \times 10^{-9}$	
30CH aqua	$10^{-60}$	$10^{-54}$	$3 \times 10^{-9}$	<b>0,001mg = 1 µg</b>
200K aqua	$10^{-400}$	$10^{-396}$	$3 \times 10^{-9}$	<b>0,0025mg = 2,5 µg</b>
Diluted $10^{-60}$ aqua	$10^{-60}$	$10^{-54}$	$3 \times 10^{-9}$	<b>0,003mg = 3 µg</b>
Pure aqua 30CH	0	0	0	<b>0,002mg = 2 µg</b>

lyophilised Cuprum 4CH magnified x40 pure sample (without crushing)



lyophilised Cuprum 4CH magnified x800 (after new crushing)



Cu 4CH 0005

2016/04/26

11:31 HM

D7.9

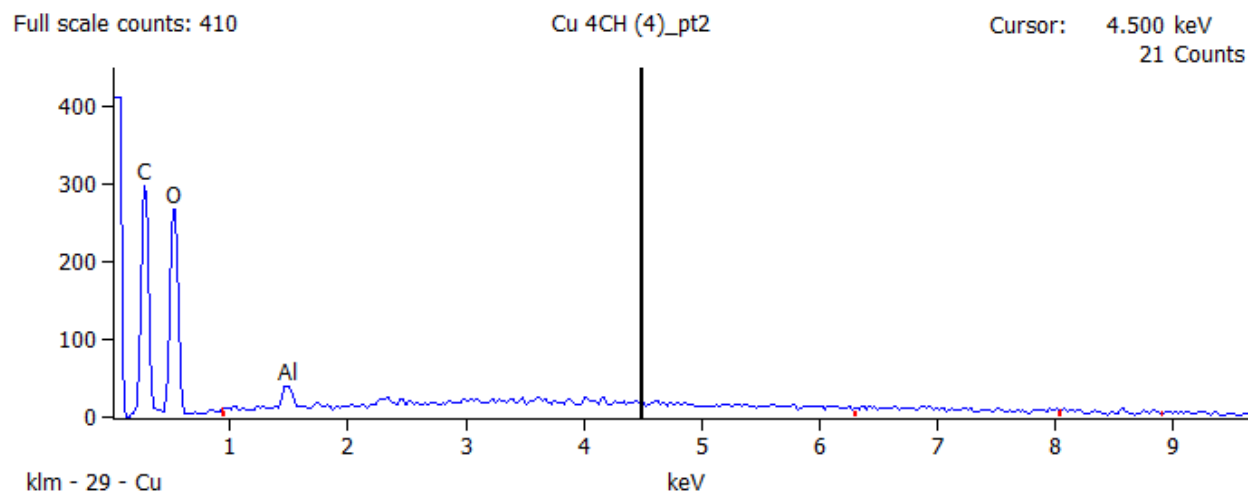
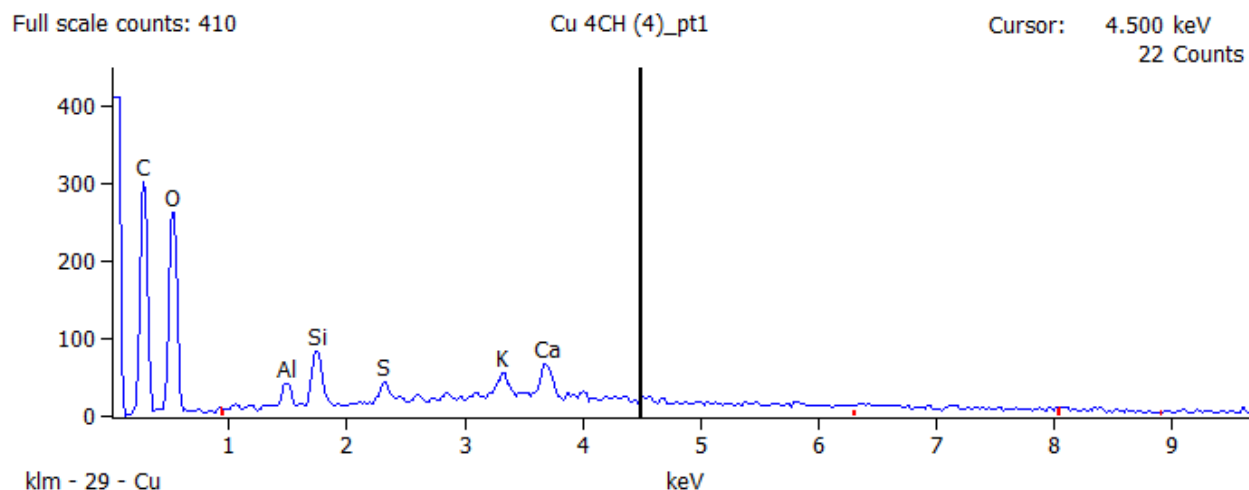
x800

100 µm

SYSMEX - Hitachi TM3030PLUS

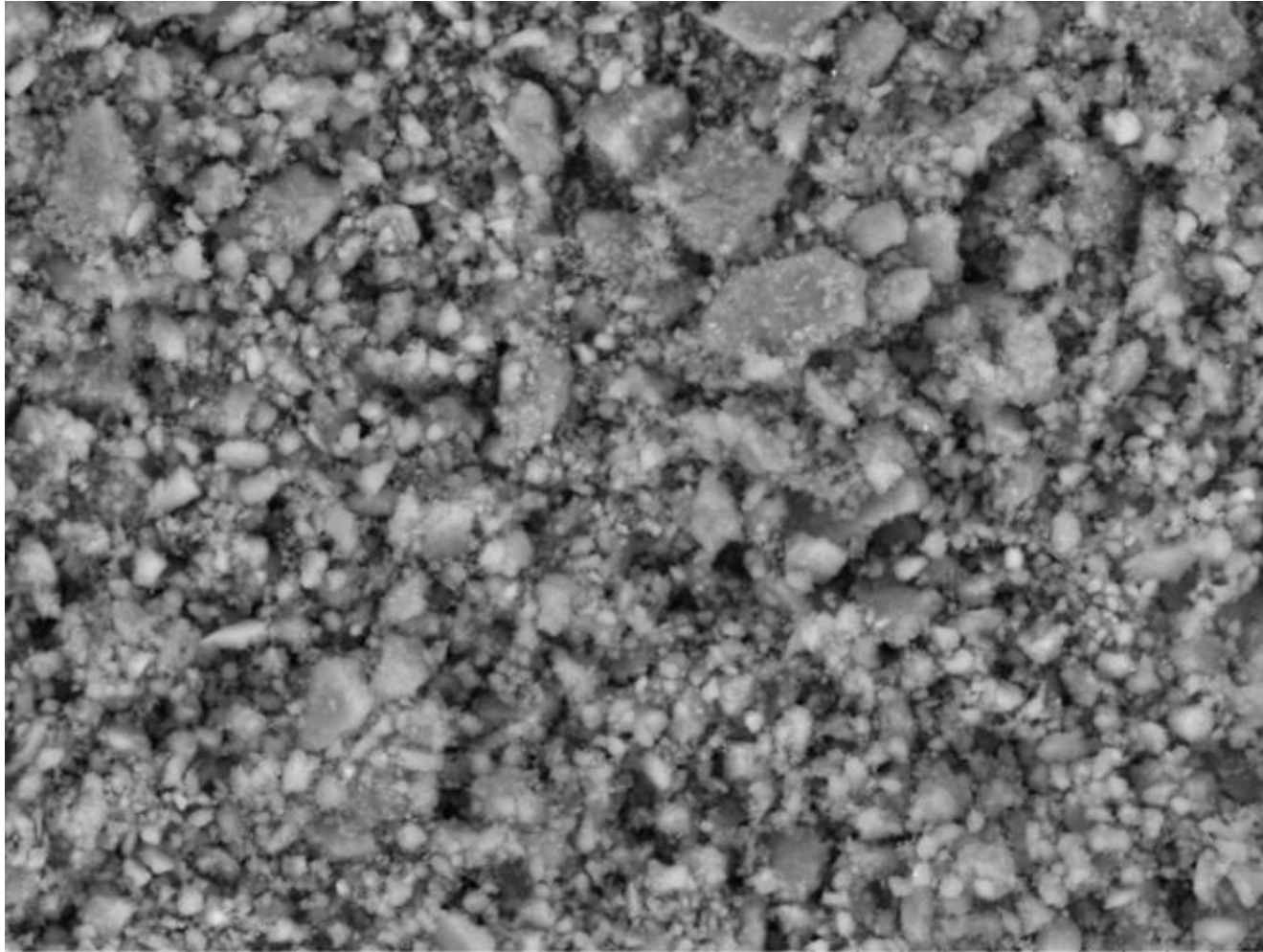


After crushing: expected lactose + points with Calcium/Silicium in Cuprum 4CH





lyophilised Aqua pura 30CH magnified x2500 (trituated)



Aqua 30CH 0000

2016/04/26

12:28 HM

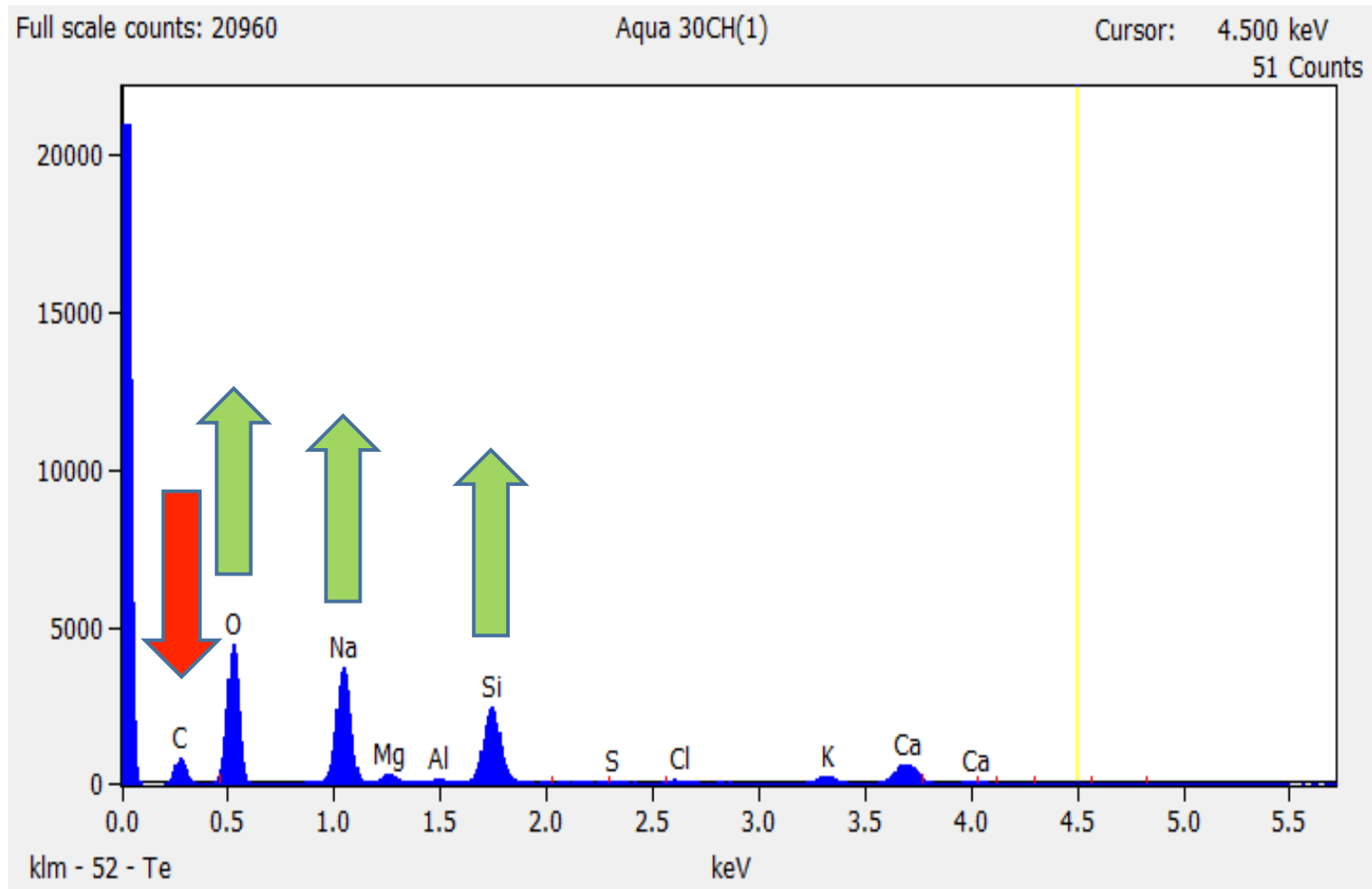
D8.0

x2.5k

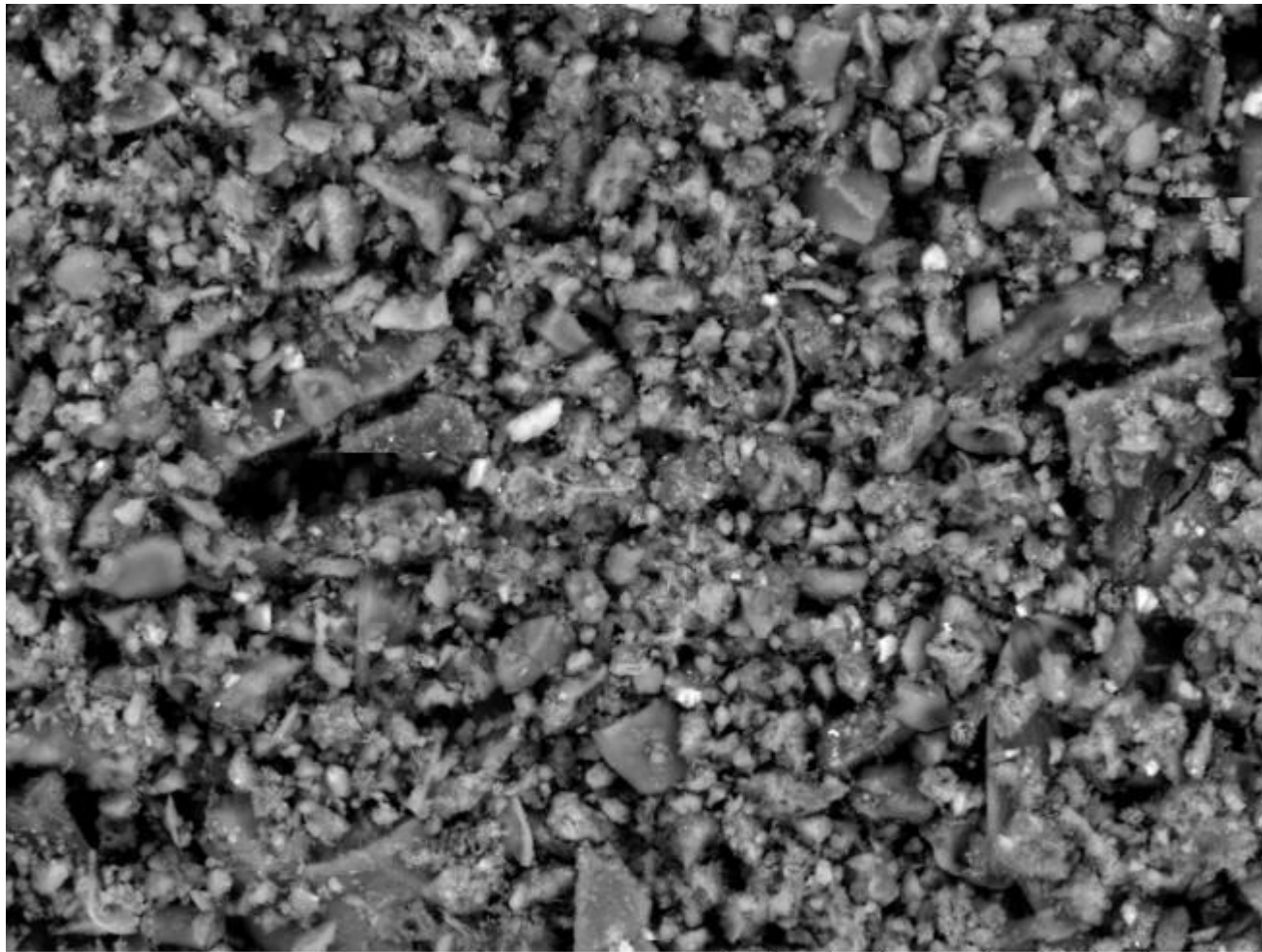
30 µm

SYSMEX-Hitachi TM3030PLUS

## lyophilised Aqua pura 30CH composition after trituration



lyophilised Cuprum 30CH magnified x1800 (crushed)



CUPR 30C 0000

2016/04/26

12:13 HM

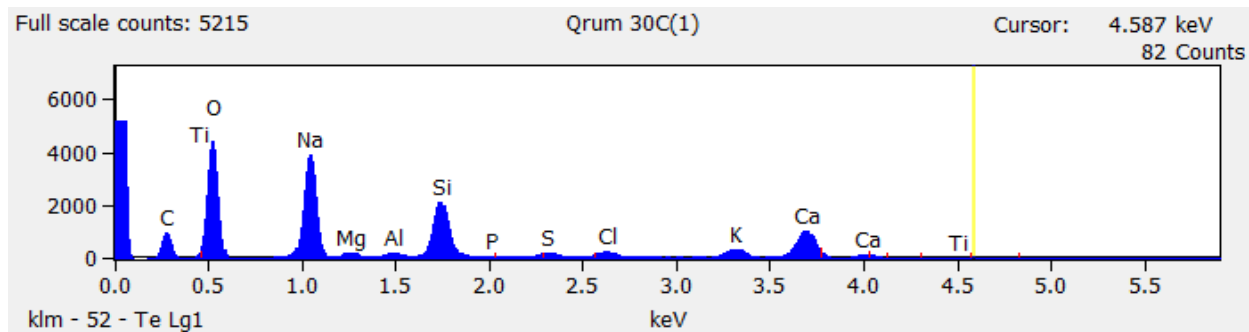
D8.0

x1.8k

50 µm

Hitachi TM3030PLUS Qrur30C

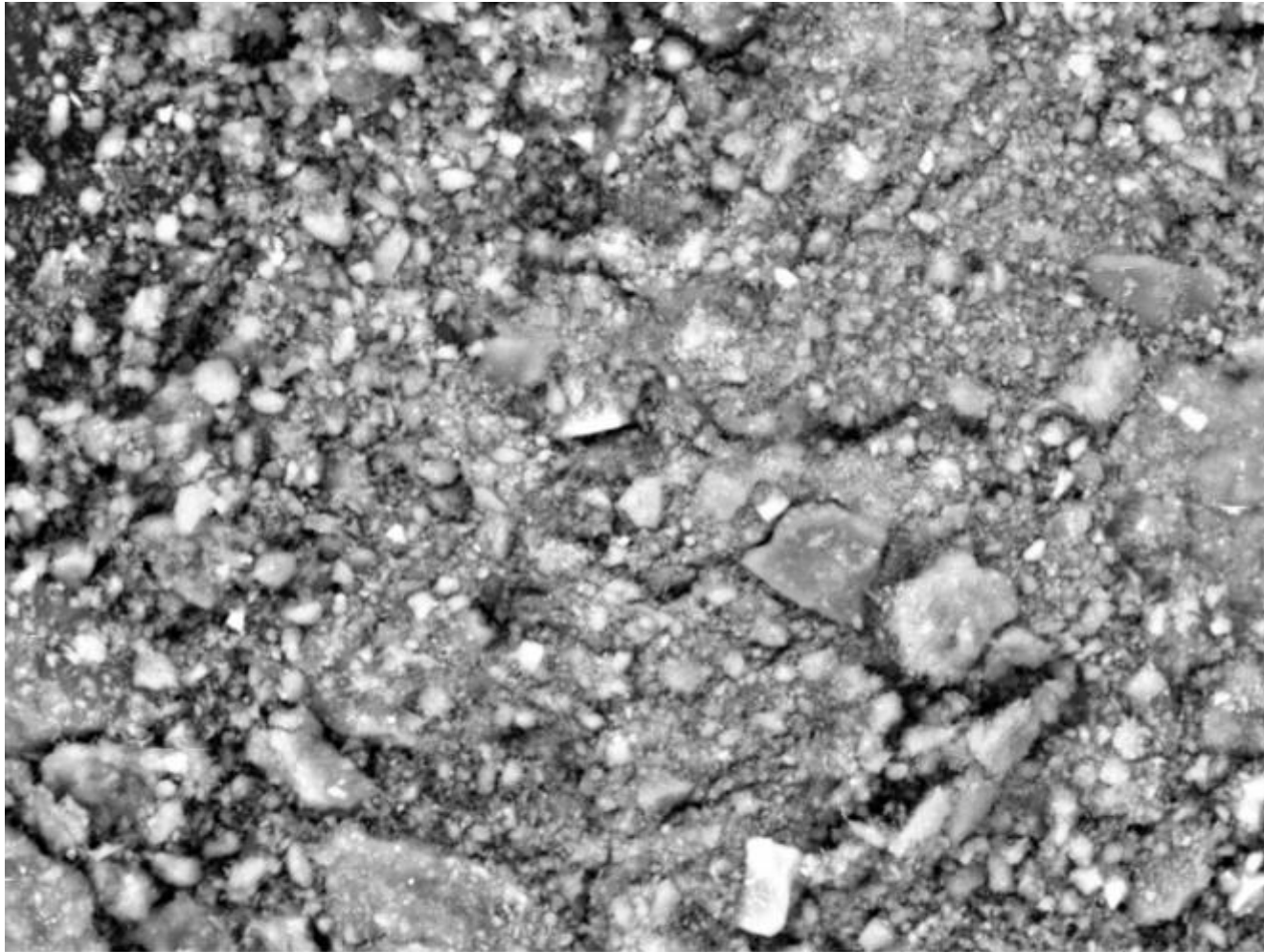
# lyophilised Cuprum 30CH composition after crushing



Element Line	Int. Cps/nA	ZAF	Weight %	Weight % Error	Atom %	Formula	Compnd %
C K	---	5.591	10.42	± 0.15	16.51	<b>C</b>	<b>10.42</b>
O K	---	4.280	42.66	± 0.31	50.74	<b>O</b>	<b>42.66</b>
Na K	---	2.690	22.29	± 0.15	18.46	<b>Na</b>	<b>22.29</b>
Mg K	---	2.772	0.95	± 0.06	0.74	Mg	0.95
Al K	---	2.112	0.54	± 0.04	0.38	Al	0.54
Si K	---	1.647	9.86	± 0.09	6.68	<b>Si</b>	<b>9.86</b>
Si L	---	0.000	---	---	---	(null)	---
P K	---	1.639	0.14	± 0.04	0.09	P	0.14
P L	---	0.000	---	---	---	(null)	---
S K	---	1.396	0.73	± 0.07	0.44	S	0.73
S L	---	0.000	---	---	---	(null)	---
Cl K	---	1.338	1.26	± 0.04	0.68	Cl	1.26
Cl L	---	0.000	---	---	---	(null)	---
K K	---	1.202	2.26	± 0.05	1.10	K	2.26
K L	---	0.000	---	---	---	(null)	---
Ca K	---	1.170	8.49	± 0.15	4.03	<b>Ca</b>	<b>8.49</b>
Ca L	---	0.000	---	---	---	(null)	---
Ti K	---	1.279	0.38	± 0.06	0.15	Ti	0.38
Ti L	---	0.000	---	---	---	(null)	---
Total			100.00		100.00		100.00



lyophilised Cuprum 200K magnified x2500 (crushed)



CUPR 200K 0000

2016/04/26

12:01 HM

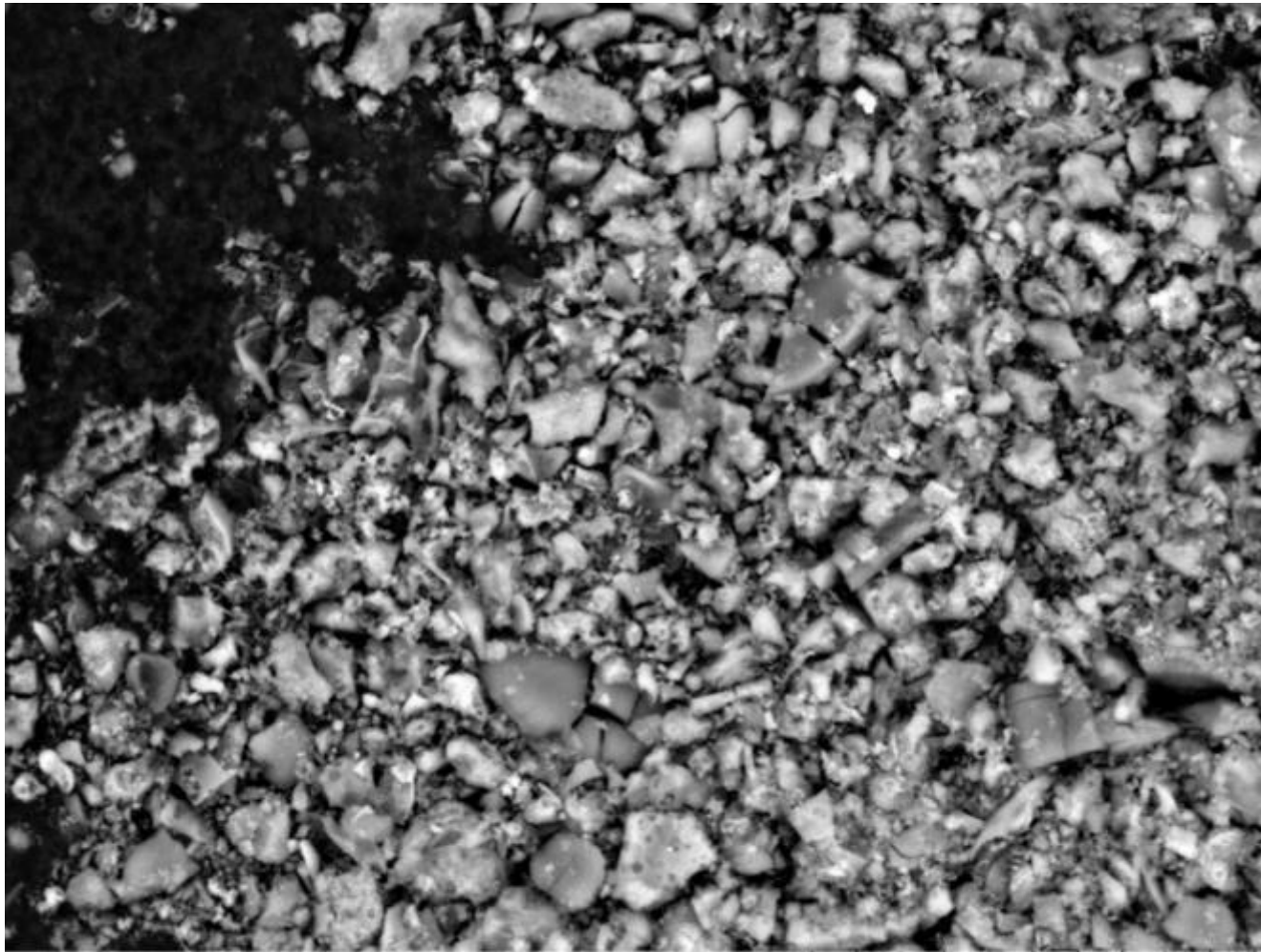
D8.1

x2.5k

30 µm

Hitachi TM3030PLUS Qrum 200K

lyophilised Cuprum 10<sup>-60</sup> magnified x2500 (crushed)



CUPR 60 0000 2016/04/26 11:43 HM D8.0 x2.5k 30 µm

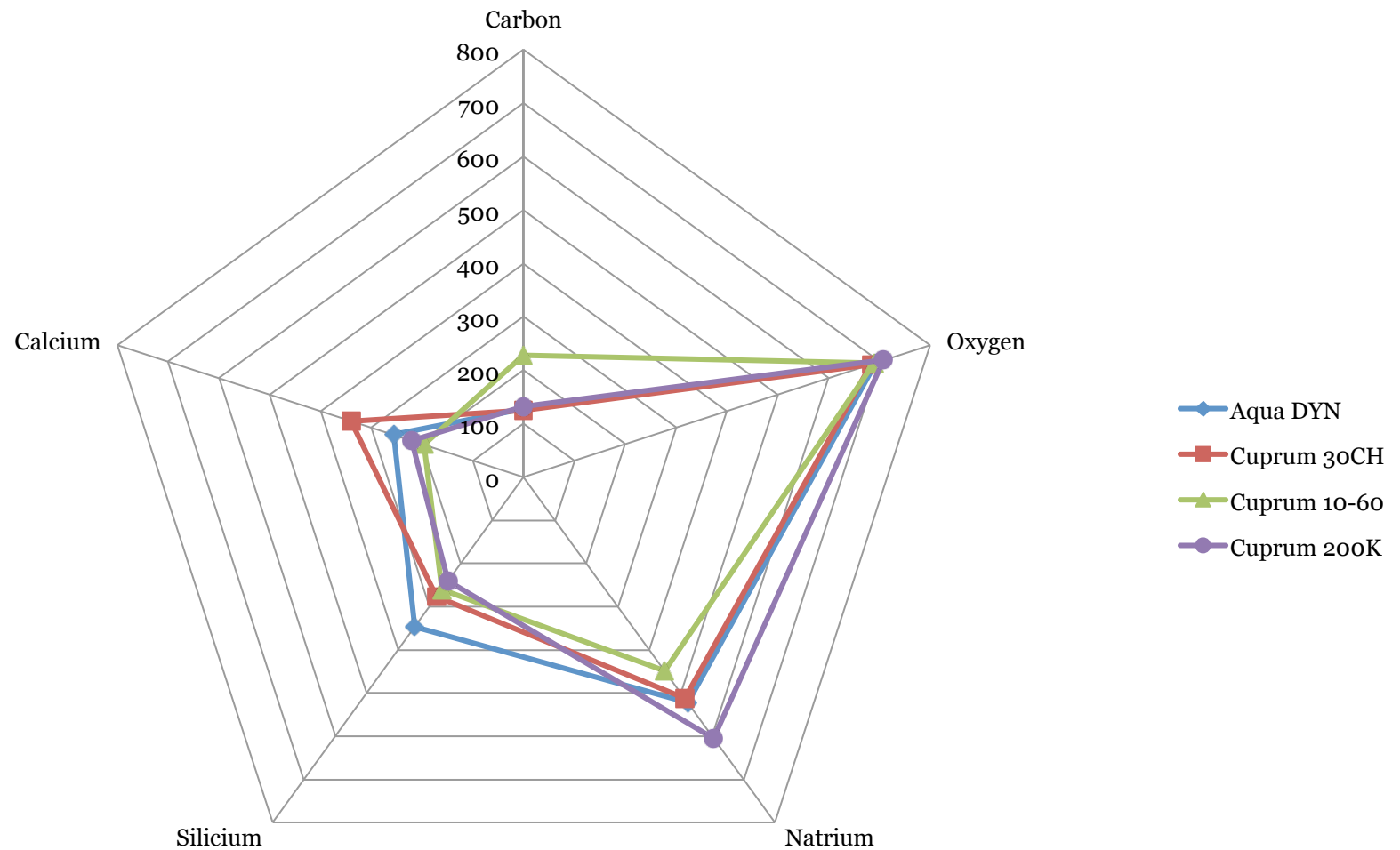
Hitachi TM3030PLUS Qrum 10 -60

## Composition of dry lyophilized material

<b>Cu</b>	<b>Dry material/g</b>	<b>C</b>	<b>O</b>	<b>Si</b>	<b>Na</b>	<b>Ca</b>	<b>/g</b>
<b>4CH</b>	<b>10mg</b>	<b>49,9%</b>	<b>47,4%</b>	<b>1%</b>			<b>9,7 mg (lactose)</b>
<b>30CH</b>	<b>0,001mg = 1 µg</b>	<b>10,4%</b>	<b>42,7%</b>	<b>9,9%</b>	<b>22,3%</b>	<b>8,5%</b>	<b>= 1ppm</b>
<b>200K</b>	<b>0,0025mg = 2,5 µg</b>	<b>11%</b>	<b>44,3%</b>	<b>8,6%</b>	<b>26,3%</b>	<b>5,5%</b>	<b>= 2,5ppm</b>
<b>Diluted 10<sup>-60</sup></b>	<b>0,003mg = 3 µg</b>	<b>19%</b>	<b>43,1%</b>	<b>9,3%</b>	<b>19,5%</b>	<b>4,9%</b>	<b>= 3ppm</b>
<b>AQUA 30CH</b>	<b>0,002mg = 2 µg</b>	<b>10,7%</b>	<b>43,3%</b>	<b>12,4%</b>	<b>22,7%</b>	<b>6,4%</b>	<b>= 2ppm</b>



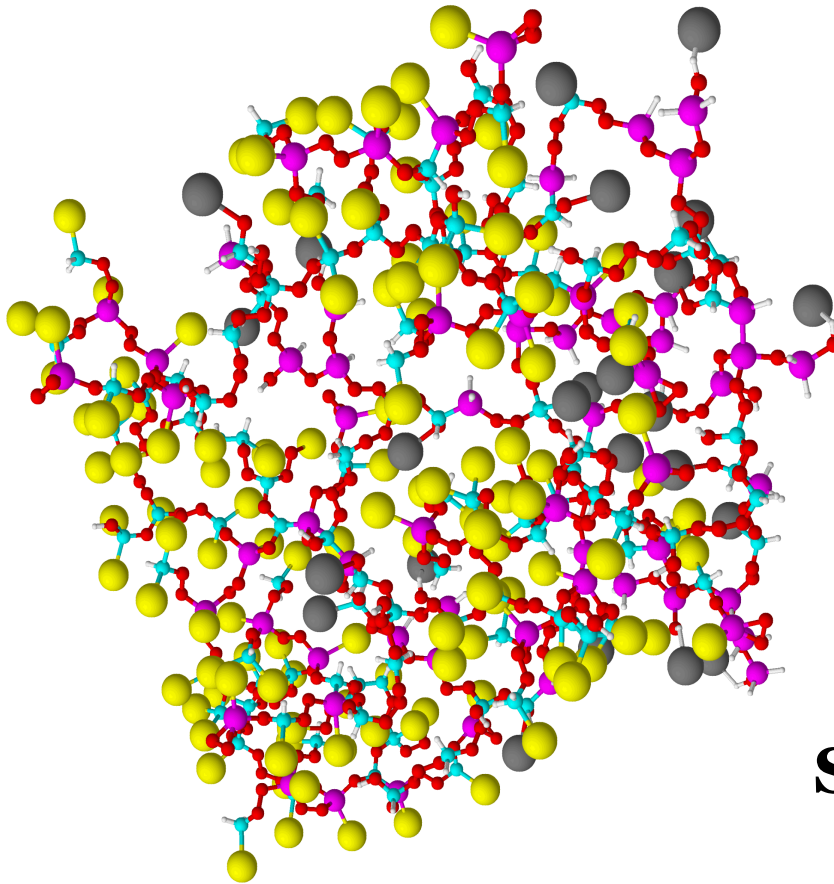
# Identified particles in dilutions/dynamizations (% \* molecular mass).



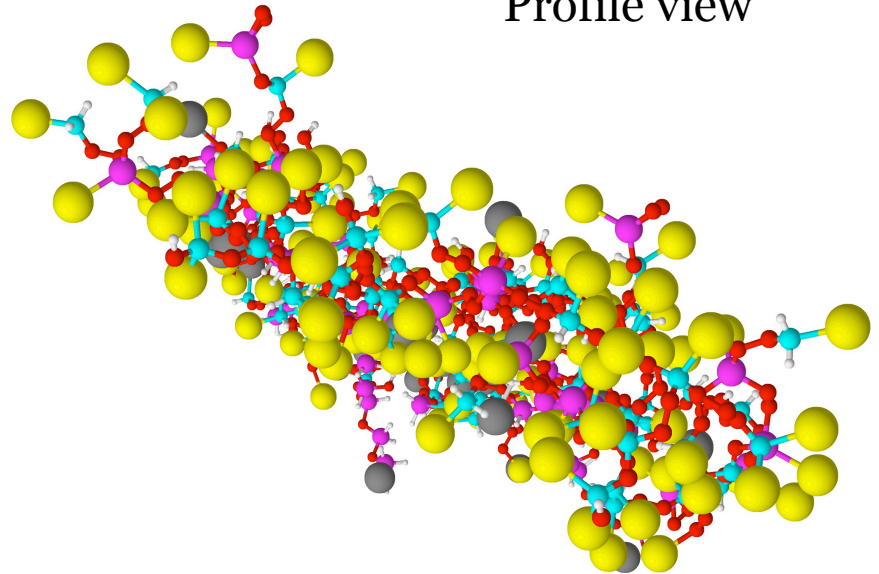
# Possible modelisation of these particles (100 smaller than in reality)

C112 H164 Ca24 Na 128 O352 Si64: Lmin 1,4nm; Lmax 1,4nm; Thickness 0,6nm.

**Yellow** = Na; Red = O; Magenta = Si; Blue = C; **Grey** = Ca; White = H.



Profile view



**Skeleton=SiO<sub>2</sub>+C=thin plates**

## Temporary conclusions SEM/EDX (1)

- The detected particles' chemical components in **Cuprum 4CH** are essentially “C” and “O”, as such it are almost pure **lactose** agglomerates ( $C_{12}H_{22}O_{11}$ ).
- After crushing of the powder obtained by lyophilisation of Aqua 30CH, Cuprum 200K, 30CH and the simply diluted Cu ( $10^{-60}$ ) small particles are identified containing dominantly **oxygen, carbon, silica, natrum and calcium**. These are clearly due to the step by step preparations in glass containers (also used for simple dilutions).
- The chemical **composition of the different particles is similar but not identical**. More controls are needed to conclude about the specificity of these differences.



## Conclusions SEM/EDX (2)

- **Hypothesis:** The specificity of the homeopathic remedy Cuprum metallicum may be related to the relative composition of the compounds but also to their organization, electric potential, size, size distribution and specific structure (see NTA results). More controls are in progress including other metals, chemicals and plants.
- Submission of 2 publications foreseen begin 2017.



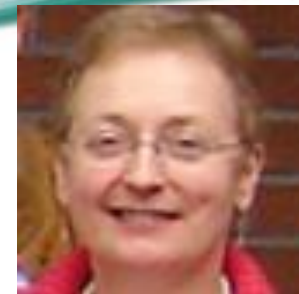
## A comprehensive approach

- ✓ Nano particles search

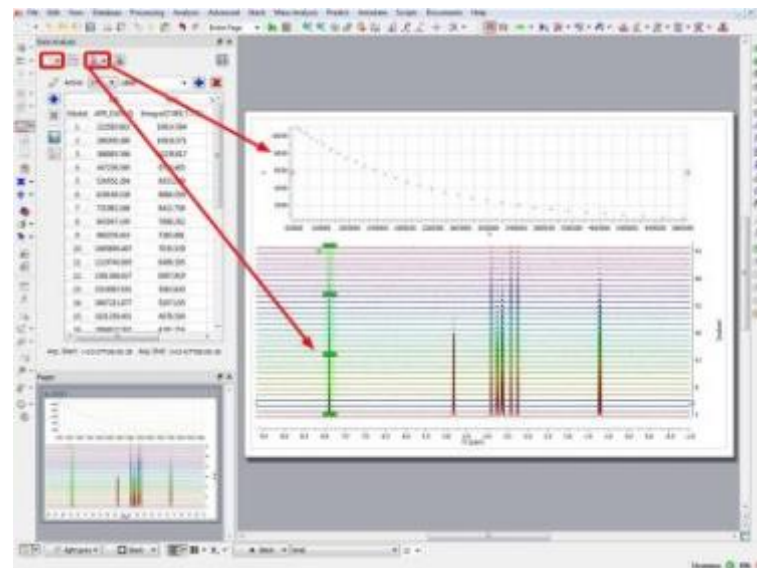
- ✓ **Solvent (water) behaviour**

- ✓ Electrons behaviour

# NMR



- NMR: Prof. Luce Vander Elst.
- Nuclear Magnetic Resonance Spectroscopy. Calculation of Relaxation Times 1, 2, for the full range of dynamization up to 30CH.
- Aim: Collection of all values for Cuprum and Gelsemium.





# NMR



- **NMR Relaxation times are correlated to the water behaviour.**
- **Aim: statistical discriminant analyse of NMR signals from different homeopathic remedies and different dynamizations versus 3 controls : pure water, dynamized lactose (for triturated stocks), dynamized water and simply diluted stocks.**





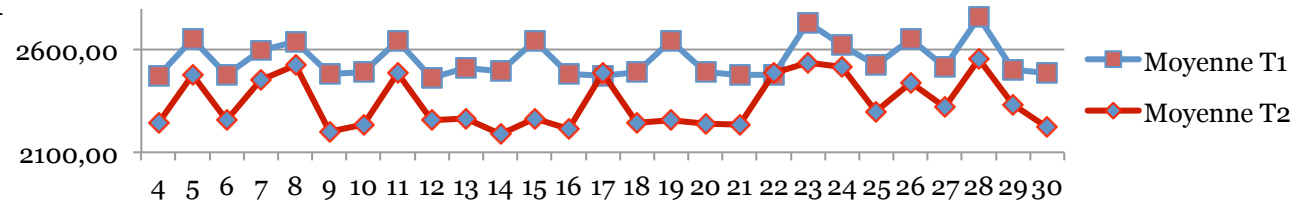
# NMR



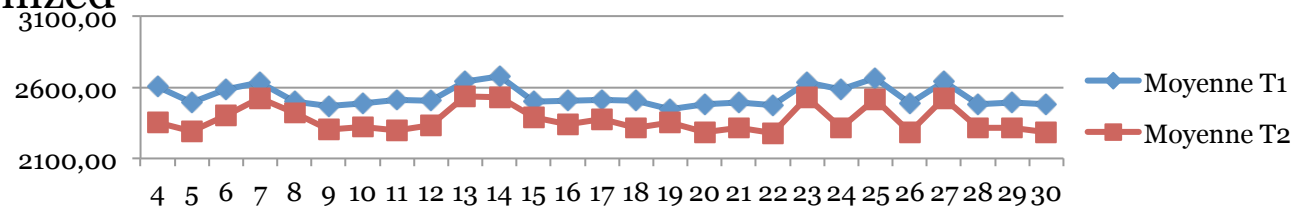
# NMR Controls



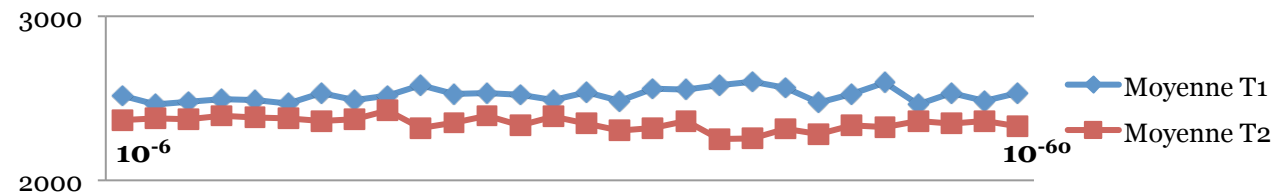
- Water control



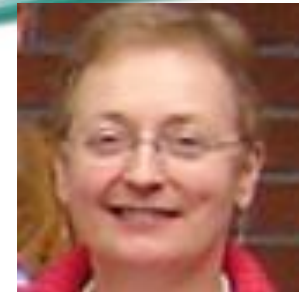
- Lactose dynamized



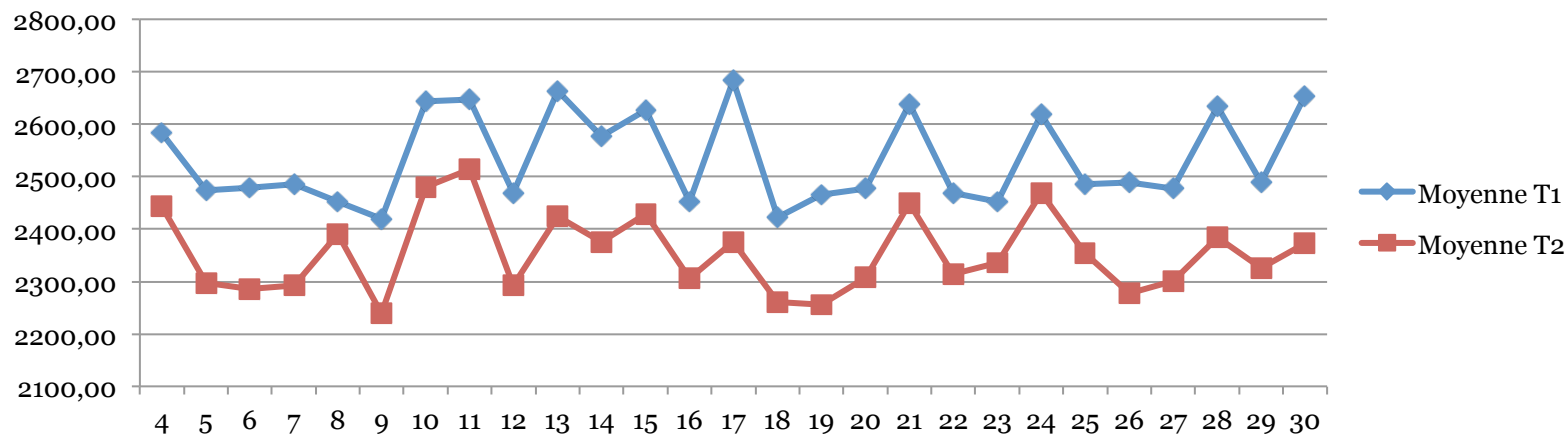
- Dynamized water



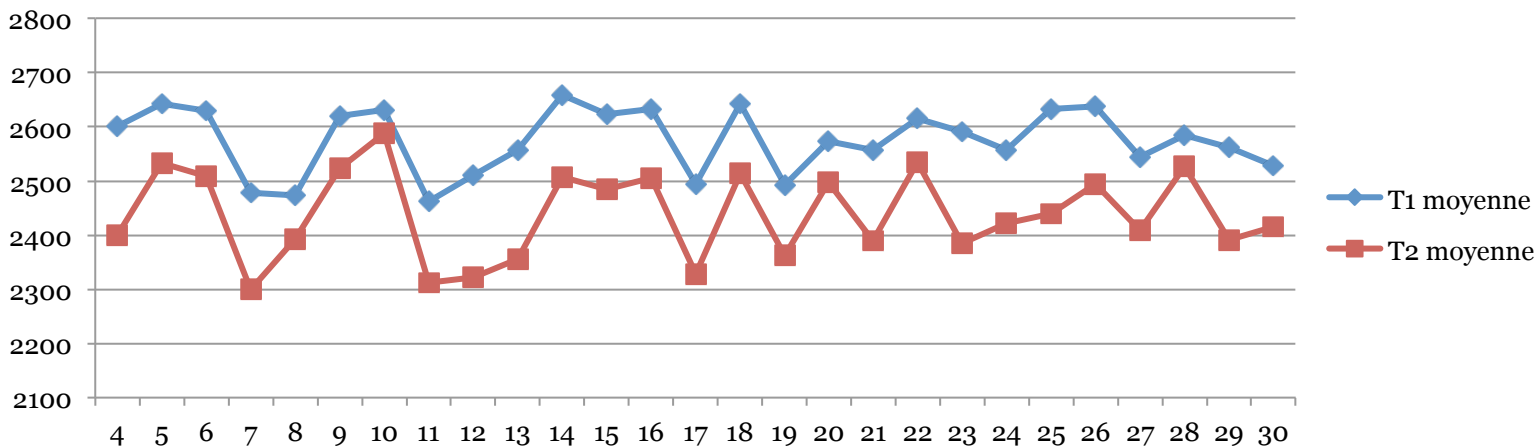
# NMR



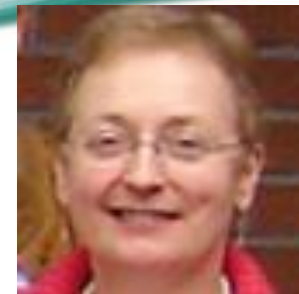
- Cuprum simply diluted (specific control)



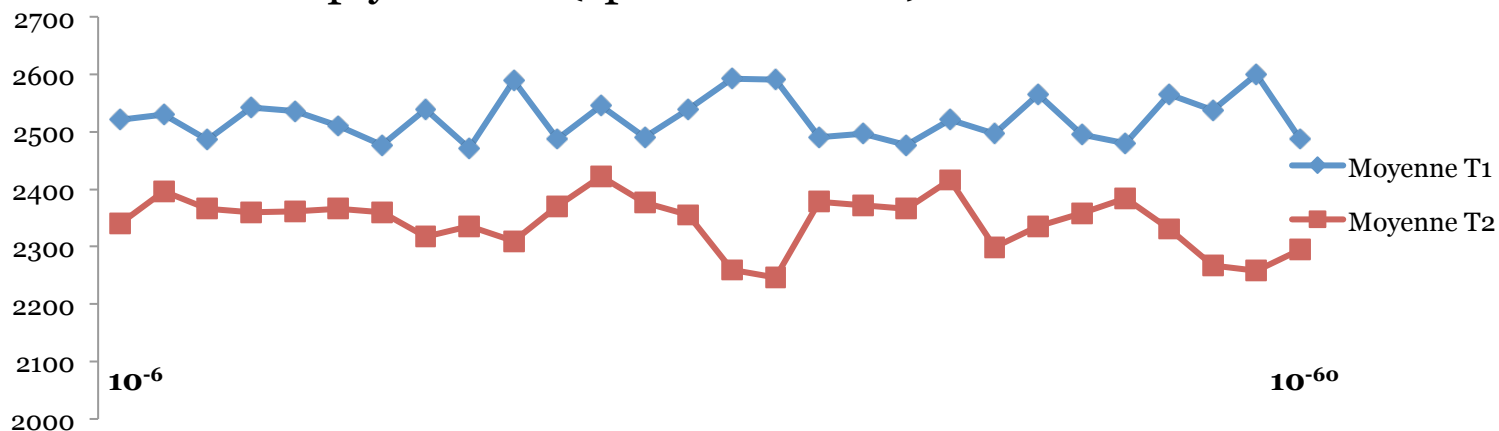
- Cuprum dynamized



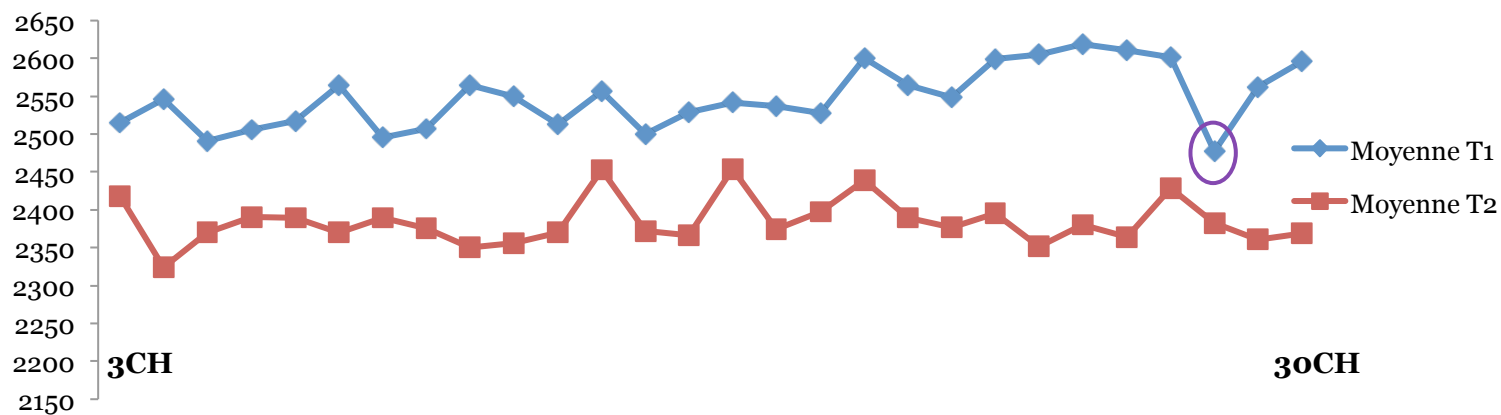
# NMR



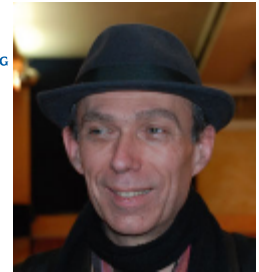
- Gelsemium simply diluted (specific control)



- Gelsemium dynamized

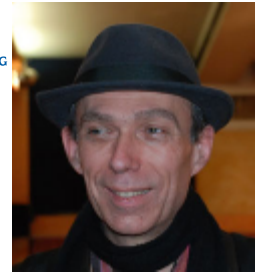


# NMR Cuprum metallicum



- The measured values are mathematically and statistically significant, they are **not random noise!**
- There is a clear significant difference in water behaviour between the verum's and their 3 controls but also between Cuprum metallicum and Gelsemium sempervirens (**specific “signatures” of the remedies**). These findings confirm previous publications of ‘Prof. Demangeat’.

# NMR Cuprum metallicum



- The NMR answer of simply diluted stocks cannot significantly be discriminate between each other.

**The specificity of the electromagnetic signature is due to the potentization process.**

- Paper will be submitted for publication very soon.





## A comprehensive approach

- ✓ Nano particles search

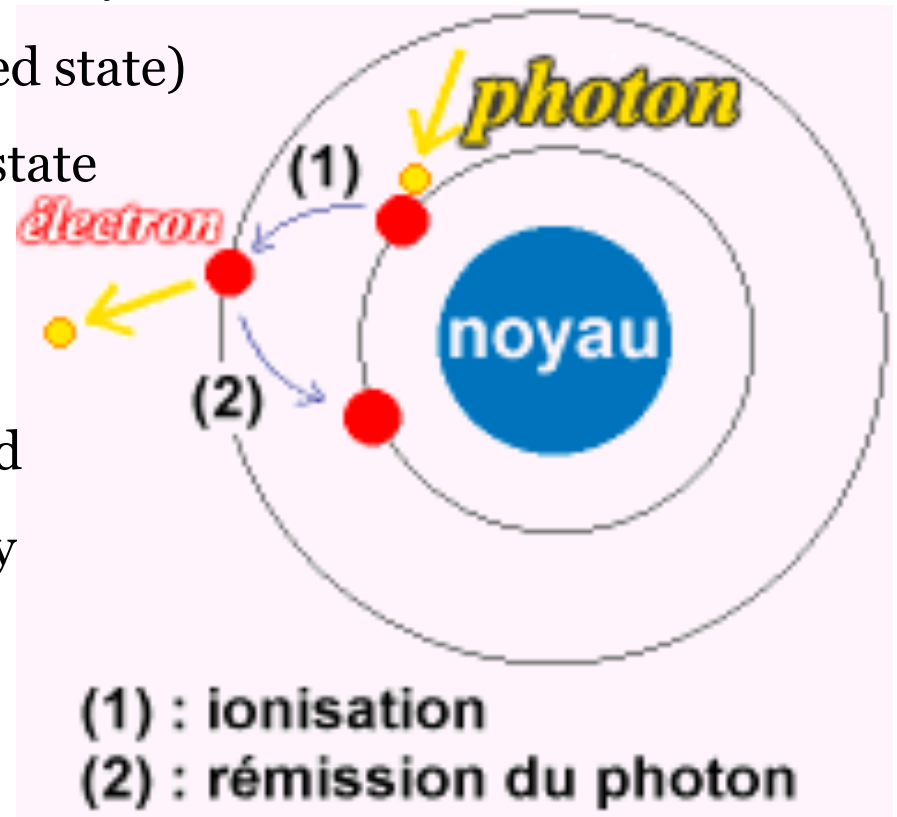
- ✓ Solvent (water) behaviour

- ✓ **Electrons behaviour**

# Atomic ionisation process

- Electric shock of very high intensity
- Electron orbital change (excited state)
- Spontaneous return to initial state
- Photon emission
- Emitted light wavelength

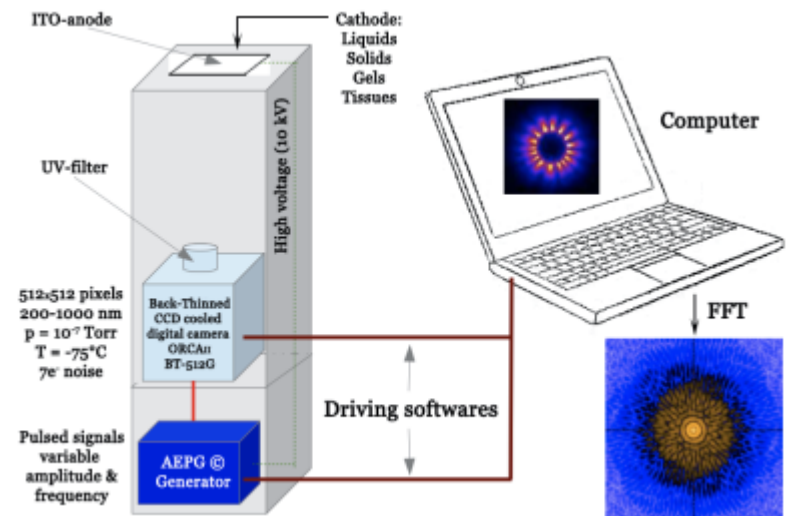
linked to initial electron spin and orbit depending of the specificity of the atom.



# EPA



- Electro Photonic Analyse of any “material”
- Aim: precise discrimination of each remedy but also of the dynamizations of a same stock.  
Allowing to test the different methods and number of dynamizations; top, midden, bottom pipetting.
- Very sensitive and specific analyse.
- One drop or one pilule is enough!



# EPA

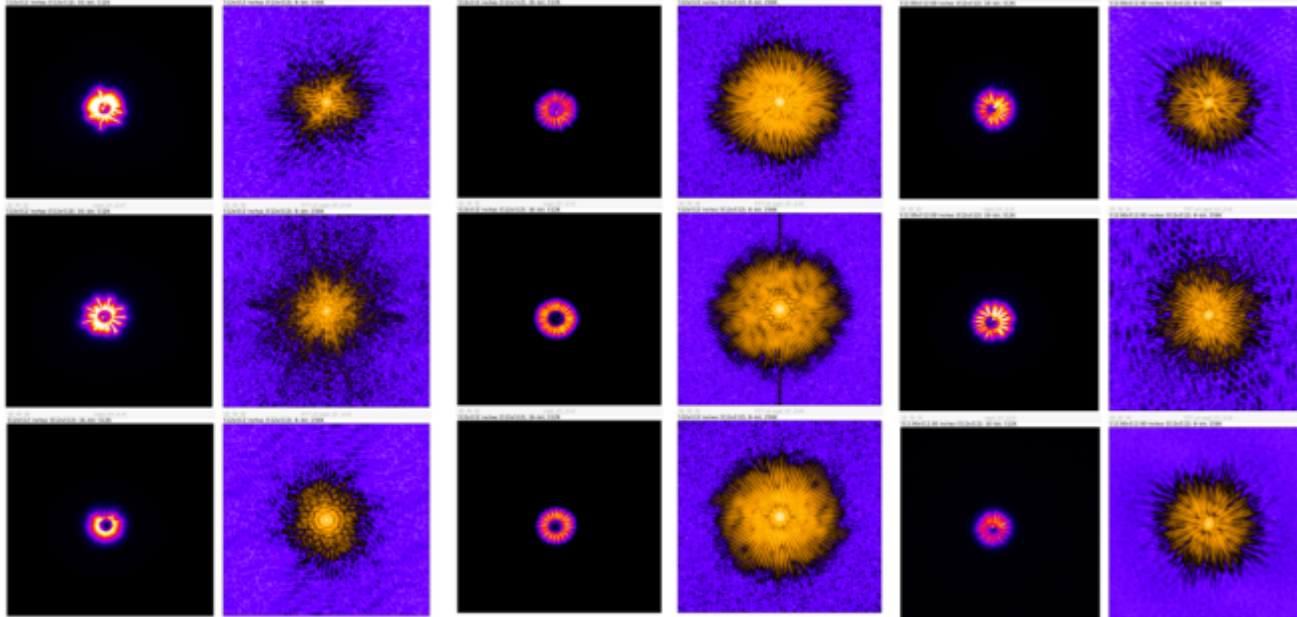
- April 2016: 607 images : 3 for 175 liquid samples and 1 for 82 impregnated pilules (size 6) samples including several controls.
- Liquids one drop of 15 $\mu$ l suspended at the top of the pipette tip and in contact with the electrode (10000 Volts, 400 Htz). When electric stimulation stop the emitted light is photographed.
- For globules the electrode is in contact at the top of the pilule (11000 Volts, 120 Htz).



**EPA** Aqua pura

**Cupr. 4C**

**Gels 30C**



**Light Energy:** Unstable

$\pm 6.000$

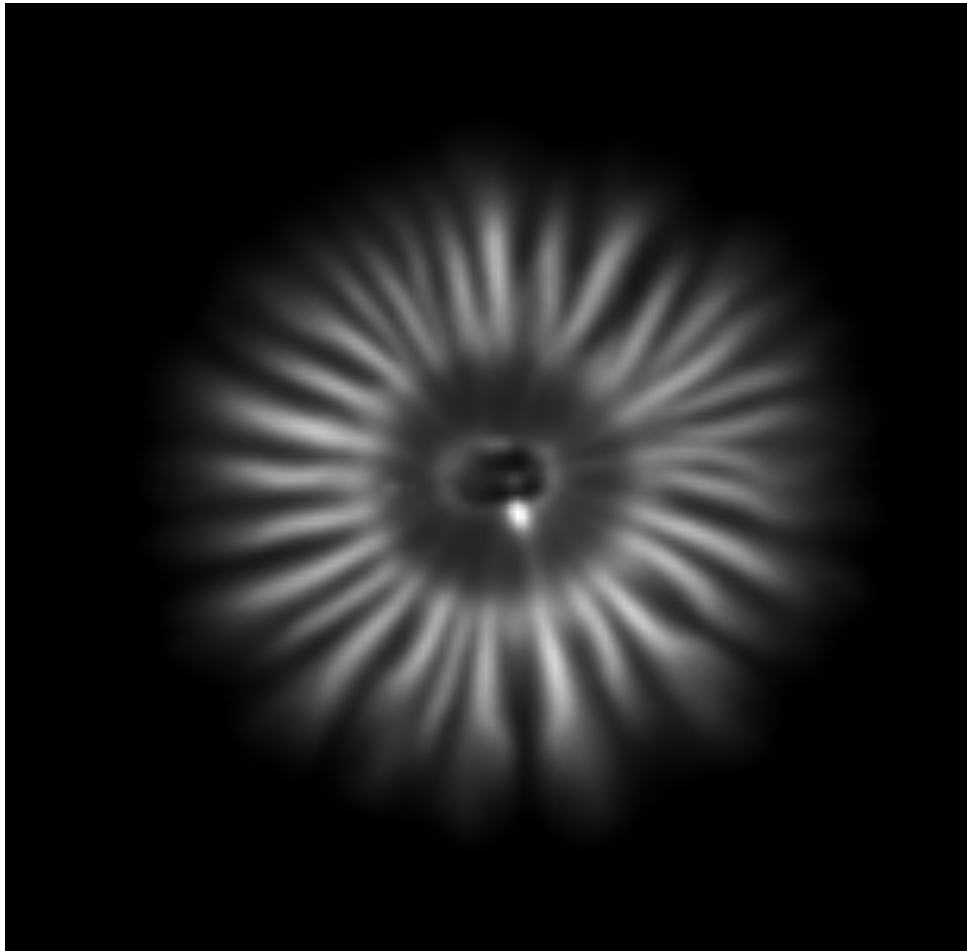
$\pm 12.000$

**Ongoing Systematic Statistical Analyse.  
Publication submission foreseen in 2017.**



**EPA granules**

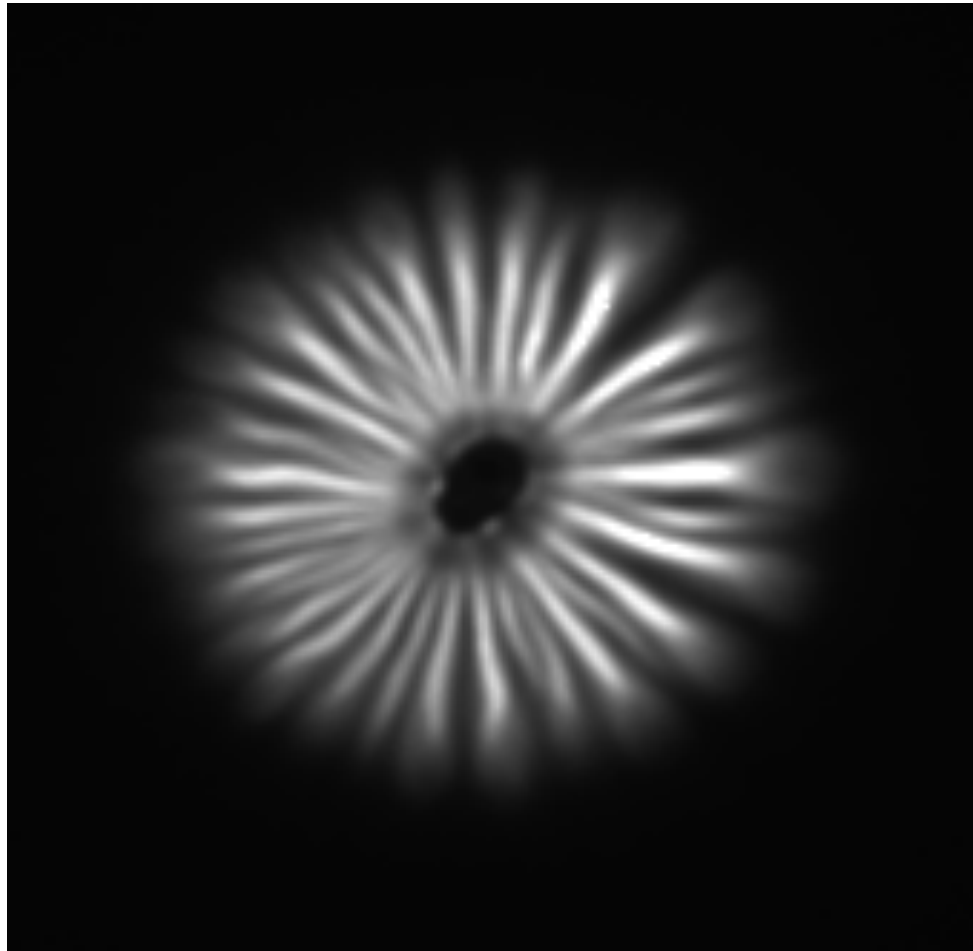
**Cuprum 4CH = low intensity 30 rays**





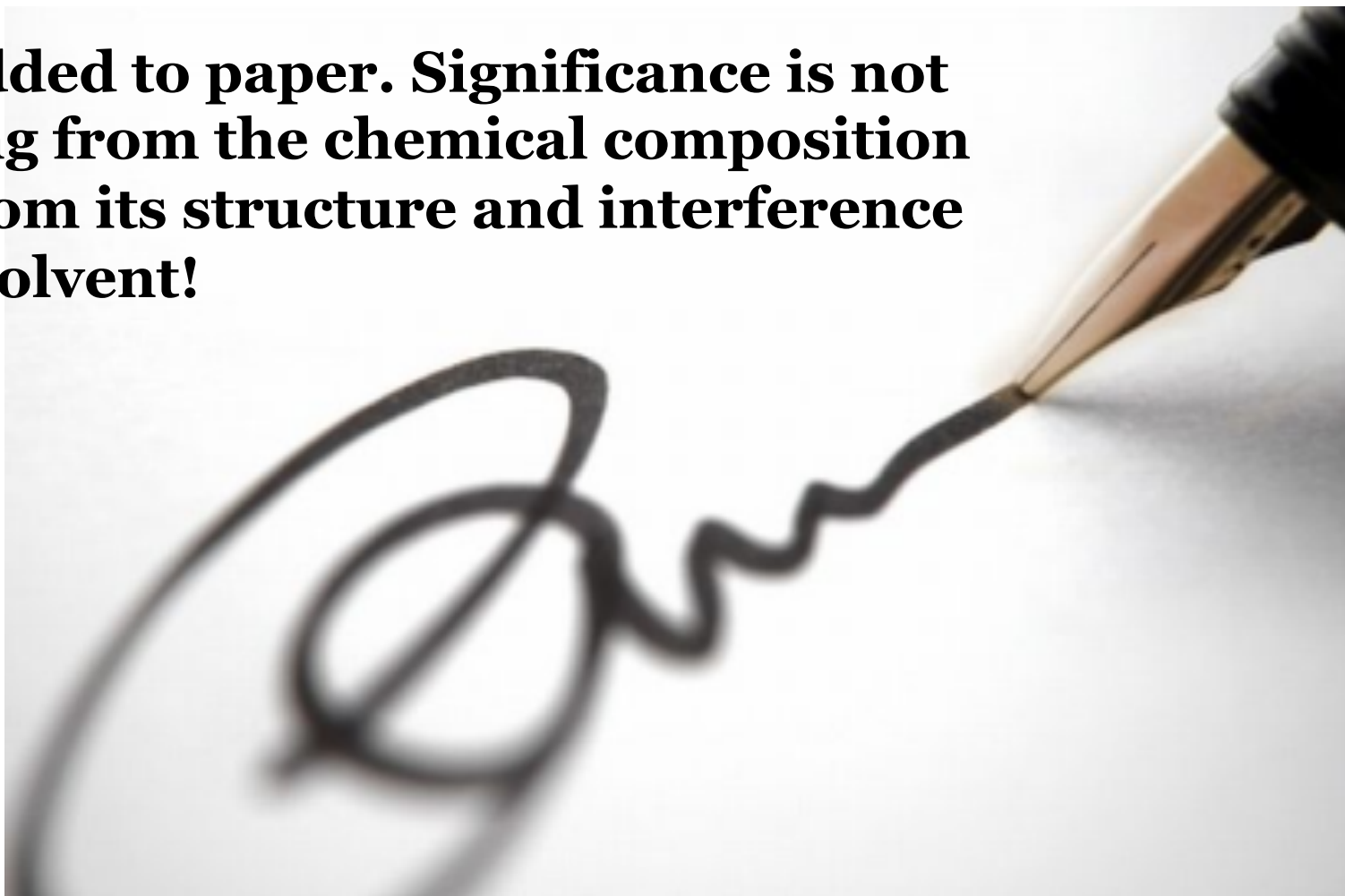
**EPA granules**

**Gelsemium 4CH = high intensity 34 rays**



Signature ?

**Ink added to paper. Significance is not coming from the chemical composition but from its structure and interference with solvent!**



*A comprehensive global presentation of all results, explanations and implications for practice: May 2017.*

**2<sup>nd</sup> DYNHOM COLLOQUIUM**  
Medicine & Homeopathy

**Basic Research  
&  
Homeopathic Practice**



**Saturday 13 May 2017  
from 9:00 to 18:00**

Crowne Plaza Brussels Airport Hotel  
Da Vincilaan 4  
1831 Diegem (Brussels)  
Belgium

**MediCongress  
Noorwegenstraat 94  
9940 Evergem (Gent)  
Belgium**

**or**

**[charlotte@medicongress.com](mailto:charlotte@medicongress.com)**

# DYNHOM

Thanks for your attention!

