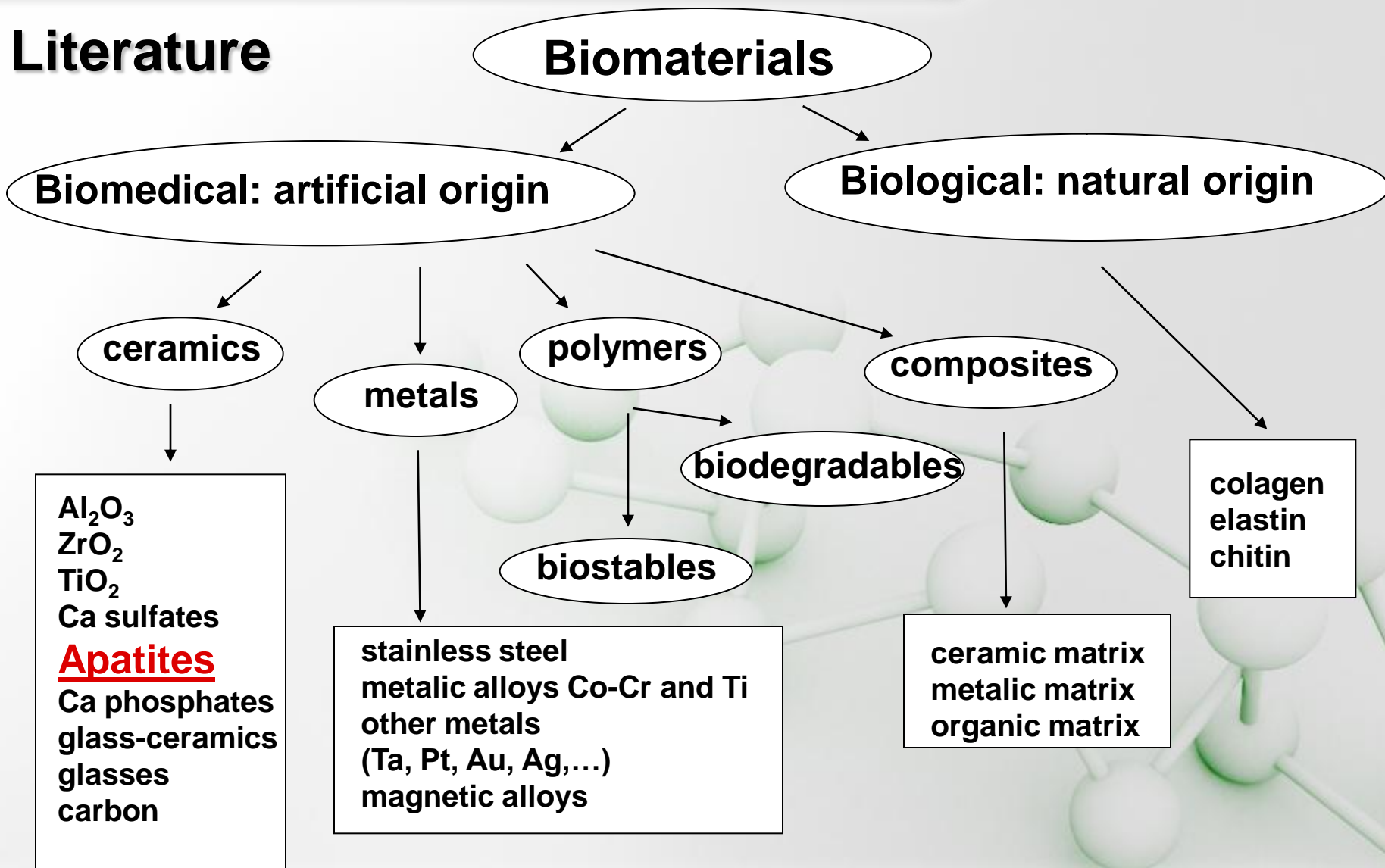




Preparation and application of nanosized hydroxyapatite compounds

BOGYA Erzsébet-Sára*, Barabás Réka, Bizo Liliana,
Cziko Melinda

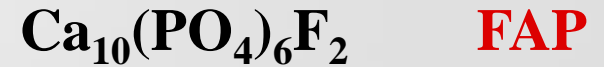
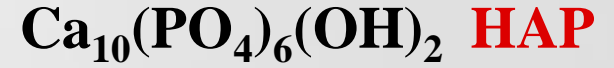
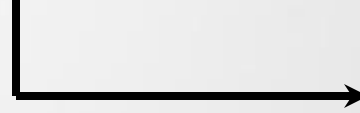
Literature



Apatites. Hydroxyapatites (HAP).

- General formula: $M_{10}(ZO_4)_6X_2$

apatites

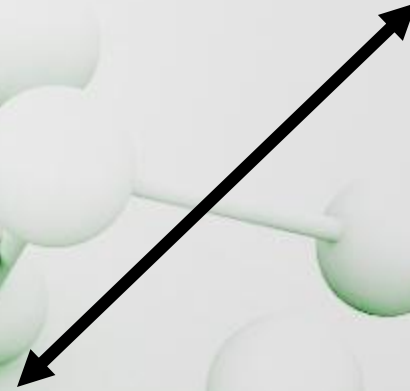


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<http://crystalsandjewelry.com>
PHOTO ENLARGED TO SHOW DETAIL
LARGER THAN LIFE PHOTO

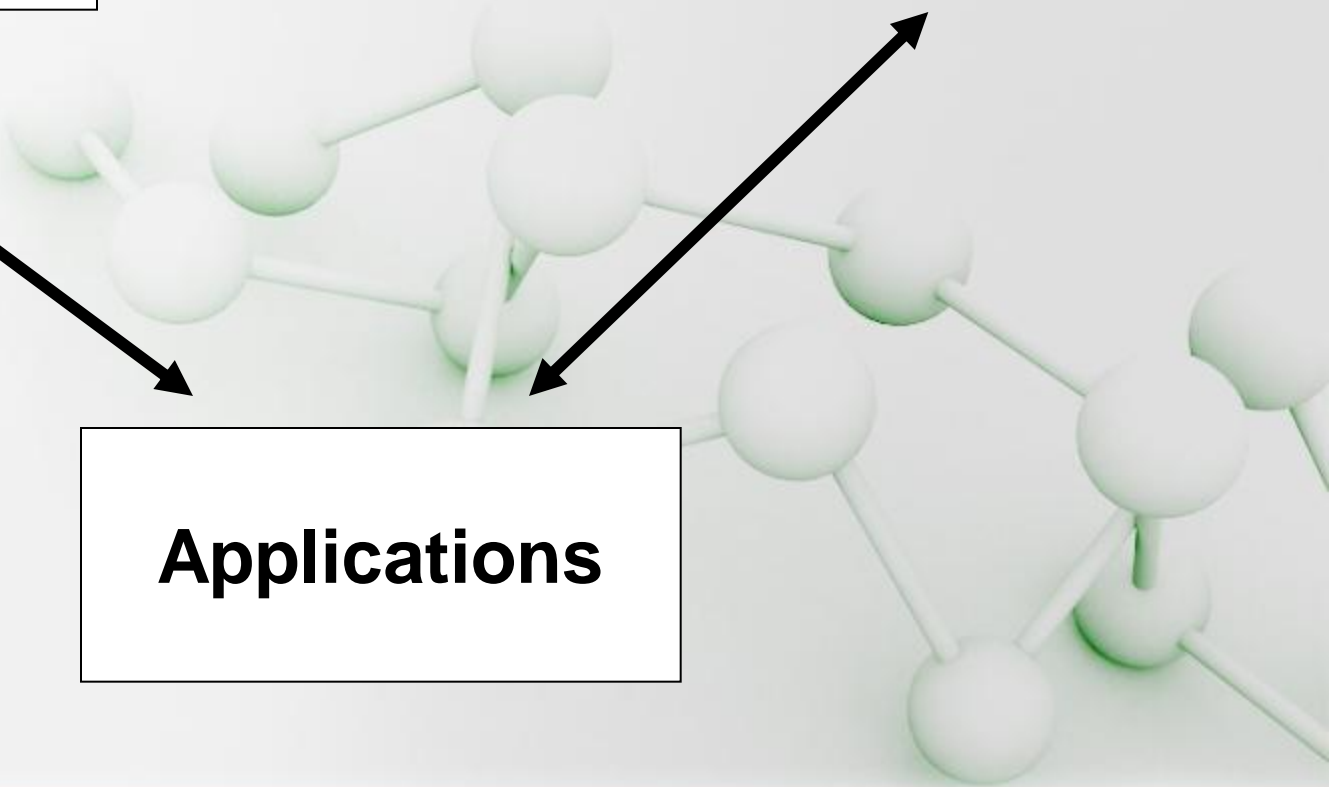


Preparation

Properties

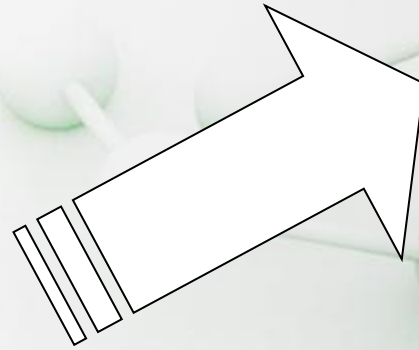


Applications





- **Higher specific surface**
- **Improved strength**
- **Increased hardness**
- **Improved ductility**
- **Resistance to tear**
- **Improved tensile properties**
- **Higher reactivity**
- **Increased thermal stability**



**Structural
modification**



Hydroxyapatites. Hydroxyapatite composites.

Composites

CS/HAP

Chitosan

Polyvinyl
pyrrolidone

PVP/HAP

Substitutes

HAP-Si

SiO₂

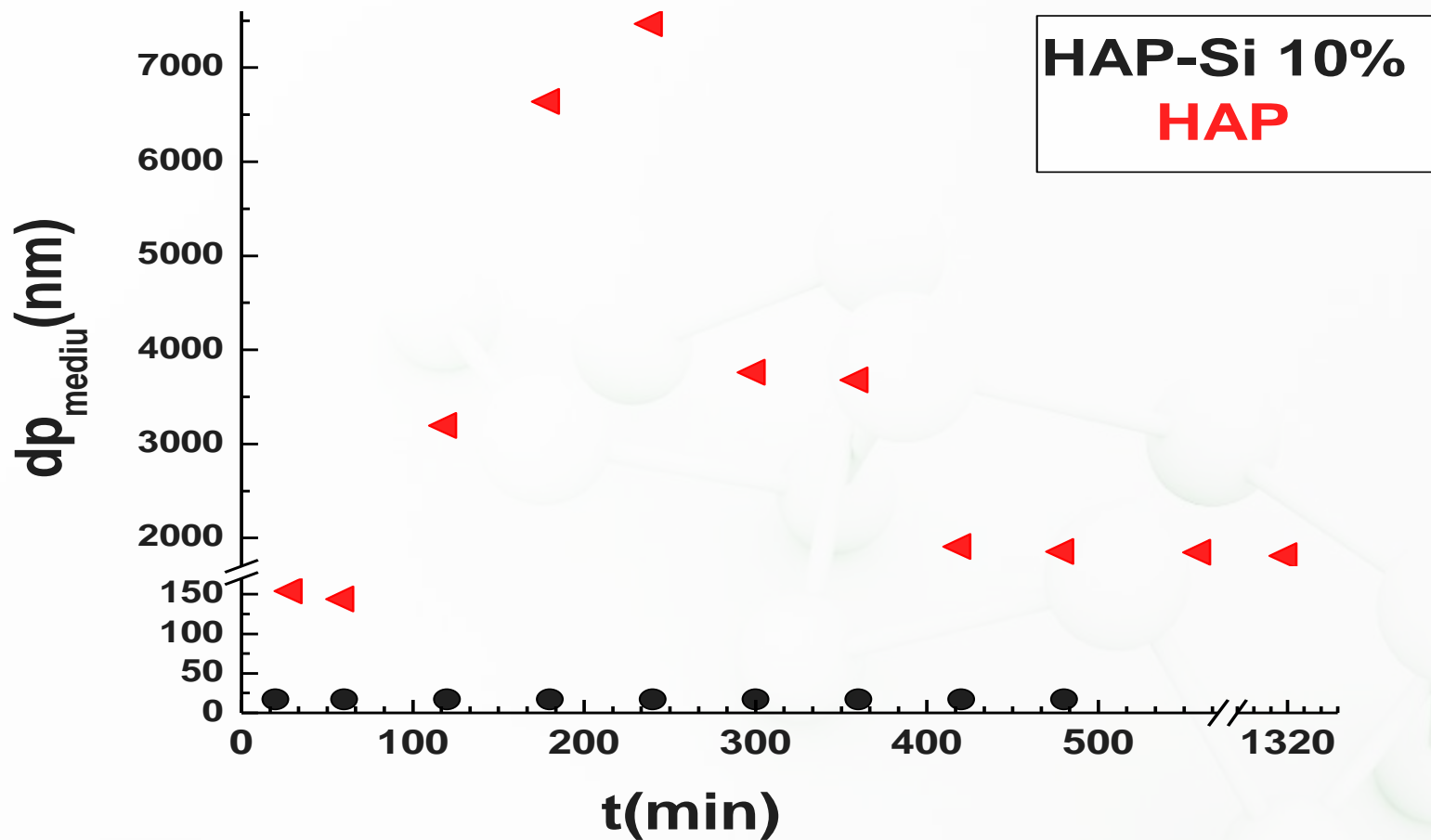
Cu²⁺

Cu-HAP

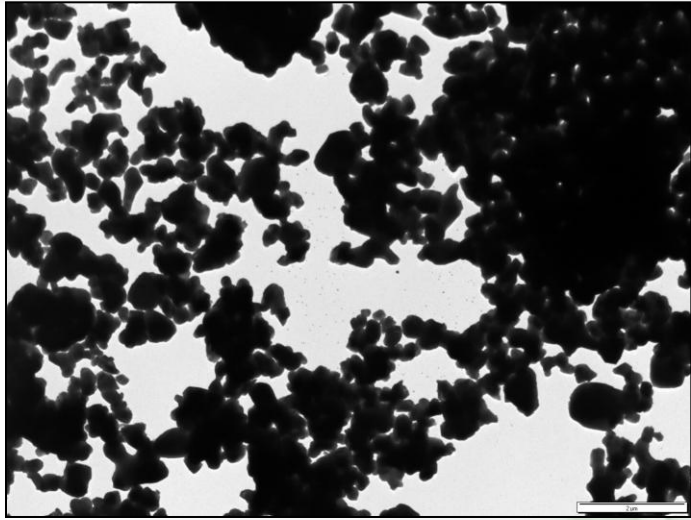
**HA
P**

- ❖ Particle size determination
- ❖ Crystallite size calculation from XRD results
- ❖ Transmission electron microscopy
- ❖ Specific surface

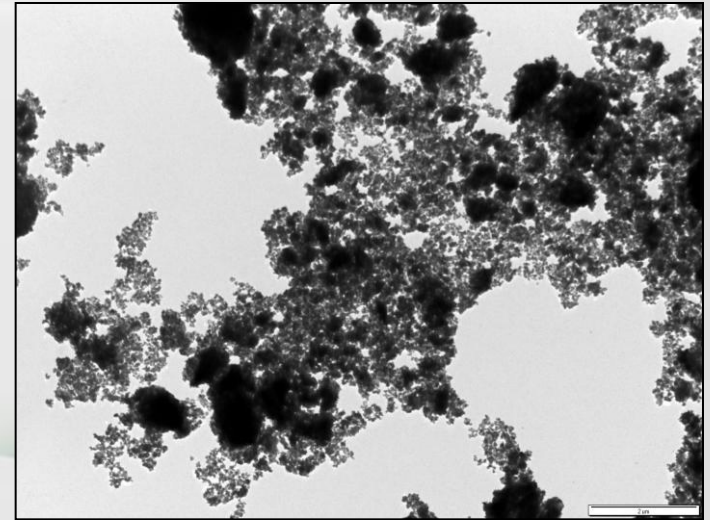
Particle size variation during synthesis



Transmission electron microscopy

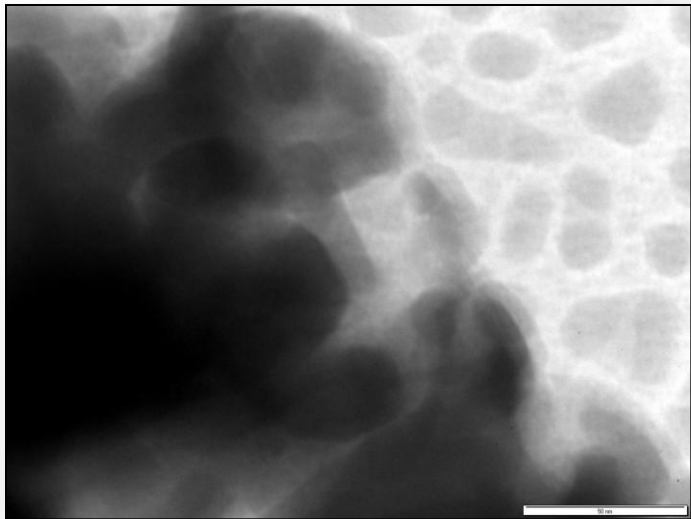


cHAP

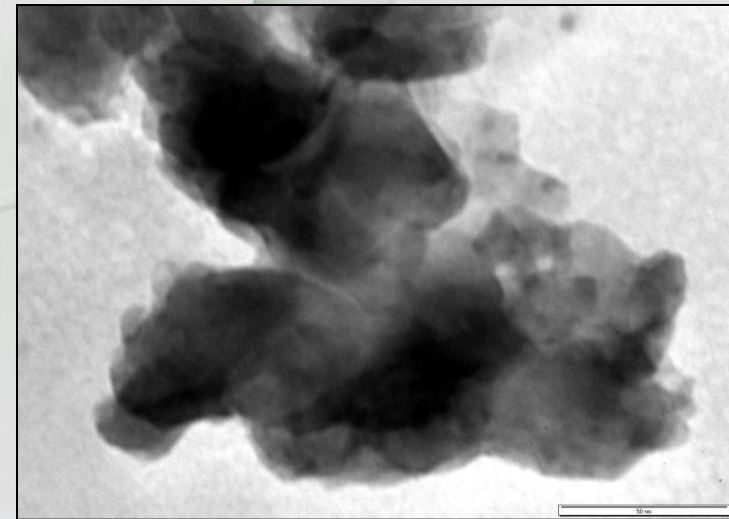


cHAP-Si 10%

2 μm



50 nm



XRD analysis. Crystallite size.

Material	D_{med} (nm)
cHAP	11.5
cHAP + Cu (solid phase)	10.2
cHAP+Cu (coprec.)	9.4
cHAP-Si 10%	9.2




Specific surface determination

Material	Medium specific surfaces
	m ² /g
ncHAP	73.7
cHAP	2.5
ncHAP-Si 5%	89.8
ncHAP-Si 10%	124.4
ncHAP-Si 15%	87.7




XRD analysis. Crystallite size.

Material	D_{med} (nm)
ncHAP 0.1 CS	3.2
ncHAP 0.5 CS	4.3



Material	D_{med} (nm)
ncHAP 0.1 PVP	9.2
ncHAP 0.5 PVP	6.2



Silica and PVP addition

↓ particle size

↓ cristallinity

application
→
domains

Nano-tehnology

Implants coatings ¹

Retaining processes

Conclusions. Outlook.

Silica addition

↑ specific surface / pore

volume

↑ thermal stability

↑ solubility

↑ sorption and adsorption

capacity

application
→
domains

Nano-technology

Solid / liquid interface

processes

Implants coating

Sorption/adsorption

processes¹

Biomaterial:

- ❑ Dense bioceramics (implants)
- ❑ porous bioceramics
- ❑ powder for gap filling
- ❑ coatings of implants



New application domains. Nanotechnology.

➤ **filtration agent in water purification**



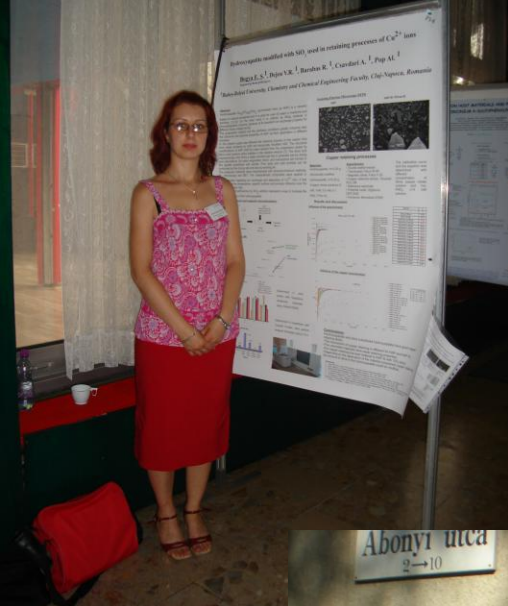
➤ **support for drugs**



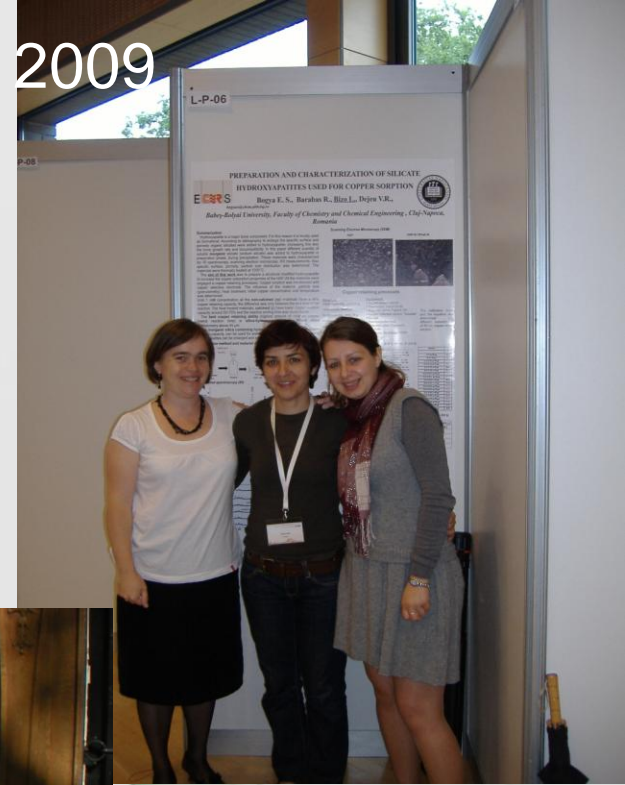
➤ **support for fungicides***



Bratislava 2008



Krakow 2009



Budapest 2010



Thank you for your attention!