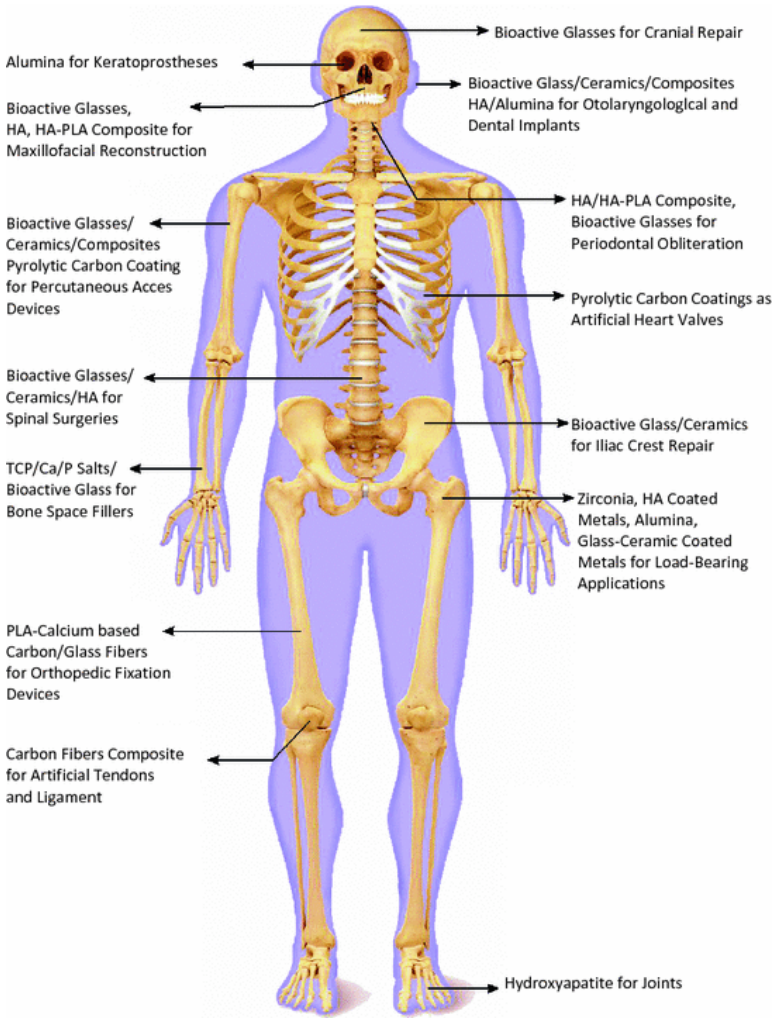
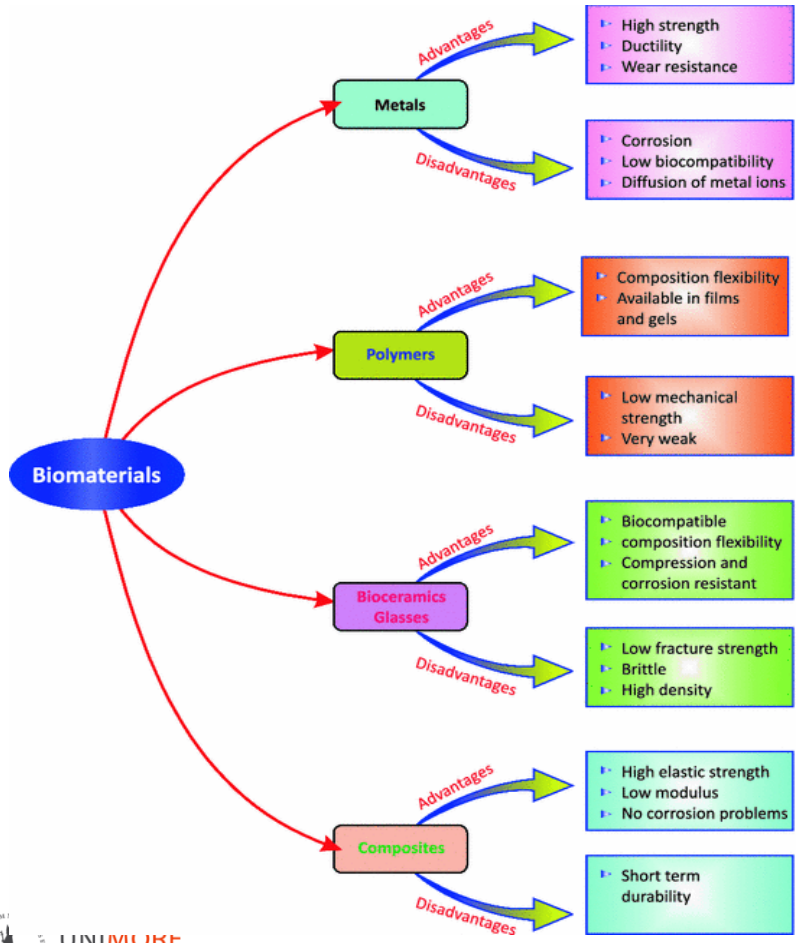


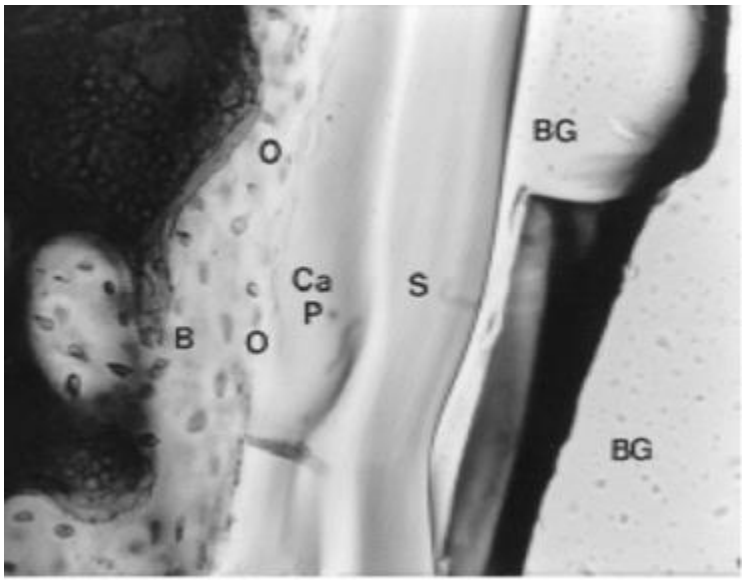
BIOMATERIAL

«a material intended to interface with biological system to evaluate, treat, augment or replace any tissue, organ or function of the body»

(II International consensus conference on biomaterials, Chester – England)

BIOACTIVE GLASSES CONTAINING BIOLOGICALLY IMPORTANT IONS AND MOLECULES

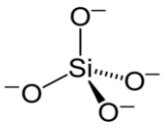




Bioactive glasses and bioactivity
in contact with biological fluids form an apatitic layer of **$[Ca_{10}(PO_4)_6(OH)_2]$** responsible for binding to living tissue

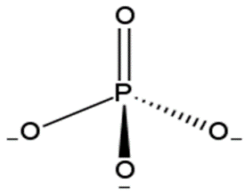
Silicate-based glasses

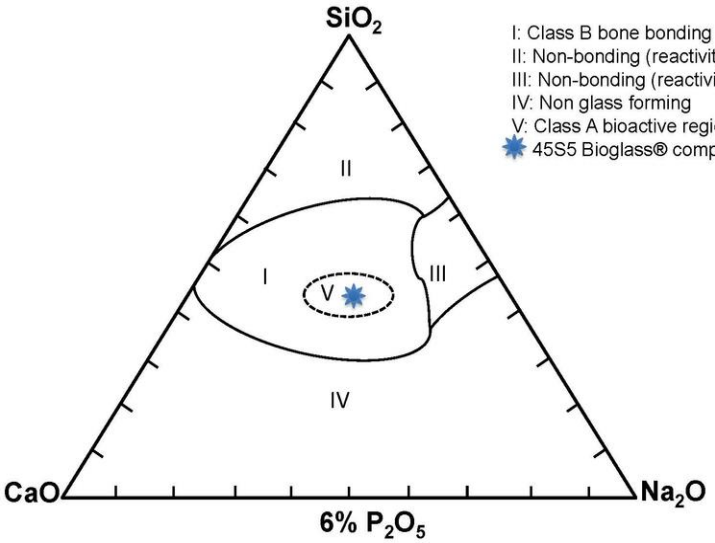
- Very slow solubility, long-term implants
- Hard tissue regeneration
- Apatite layer formation

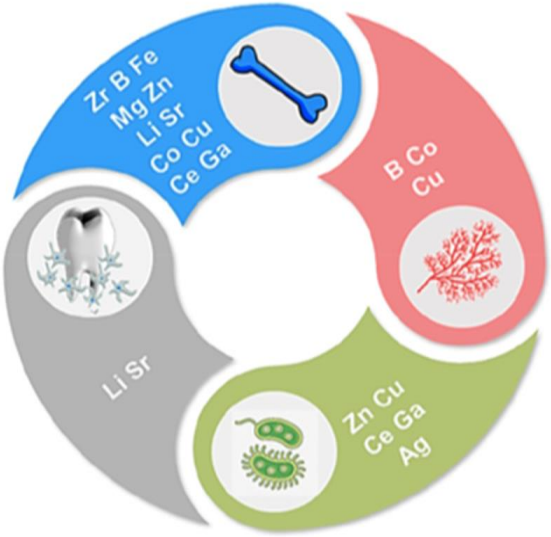


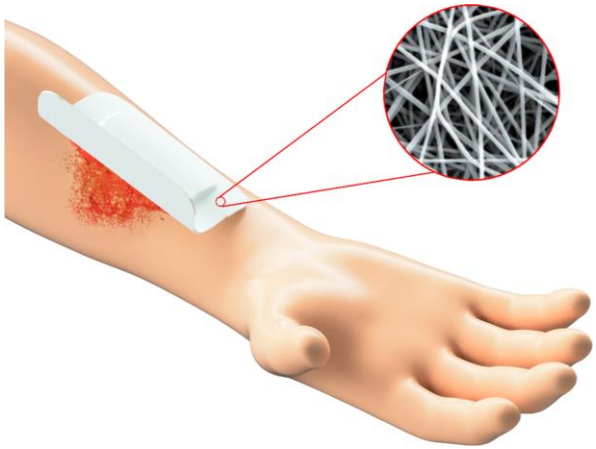
Phosphate-based glasses

- Bioresorbable, dissolve completely and very fast
- Bone regeneration promotion
- Their composition in very similar to the composition of bone and teeth
- Apatite layer formation




SiO_2
I: Class B bone bonding
II: Non-bonding (reactivity too low)
III: Non-bonding (reactivity too high)
IV: Non glass forming
V: Class A bioactive region
45S5 Bioglass® composition
II
I
V
III
IV
CaO
Na_2O
6% P_2O_5


Zr B Fe
Mg Zn
Li Sr
Co Cu
Ce Ga
B Co
Cu
Li Sr
Zn Cu
Ce Ga
Ag

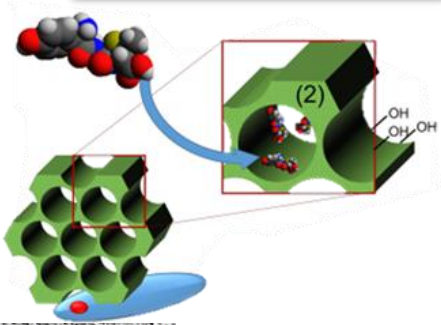


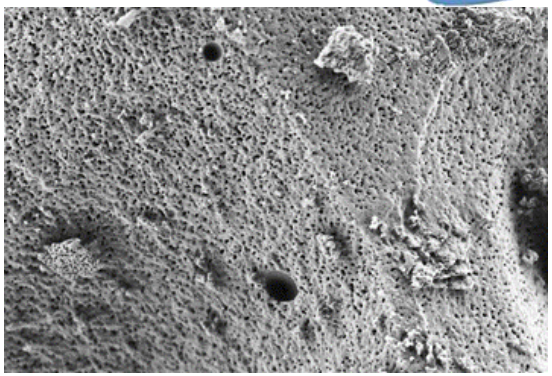
Route synthesis

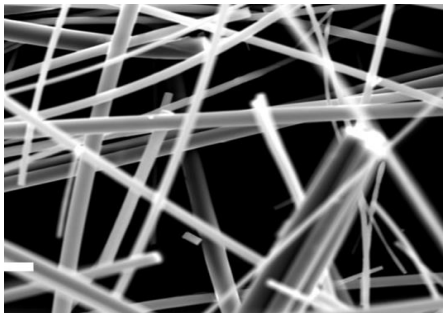
MELT QUENCHING

SOL-GEL

COACERVATE







	SiO_2	P_2O_5	CaO	CeO_2
MBG	80,0	5,0	15,0	-
MBG 1.2	79,1	4,9	14,8	1,2
MBG 3.6	77,1	4,8	14,5	3,6
MBG 5.3	75,8	4,7	14,2	5,3

	P_2O_5	CaO	Na_2O	CeO_2
MPG	55	30	15	-
MPG-Ce1	55	30	14	1
MPG-Ce3	55	30	12	3
MPG-Ce5	55	30	10	5
MPG-Ce10	55	30	5	10

	P_2O_5	CaO	Na_2O	CuO
MPG	55	30	15	-
MPG-Ce1	55	30	14	1
MPG-Ce3	55	30	12	3
MPG-Ce5	55	30	10	5
MPG-Ce10	55	30	5	10

Morphology (scaffolds, hydrogels, fibers) and other ions

- interaction with biomolecules (drugs and polyphenols)
- glass characterization before and after *in vitro* tests (simulated biological fluids and cell cultures) by AE, XRPD, SEM, TEM, AFM, UV-Vis, BET, DTA, ICP
- evaluation of catalase (CAT) and superoxide dismutase mimetic (SOD) activity
- drug delivery systems
- *in vivo* applications

Tirocinio esterno

Barchemicals

Applicazione delle nanotecnologie per la rimozione di inquinanti nelle acque a consumo umano

-sintesi di NPs

-caratterizzazione: XRPD,SEM,TEM, AFM, UV-Vis, ICP

-test efficacia batterica

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Sito…

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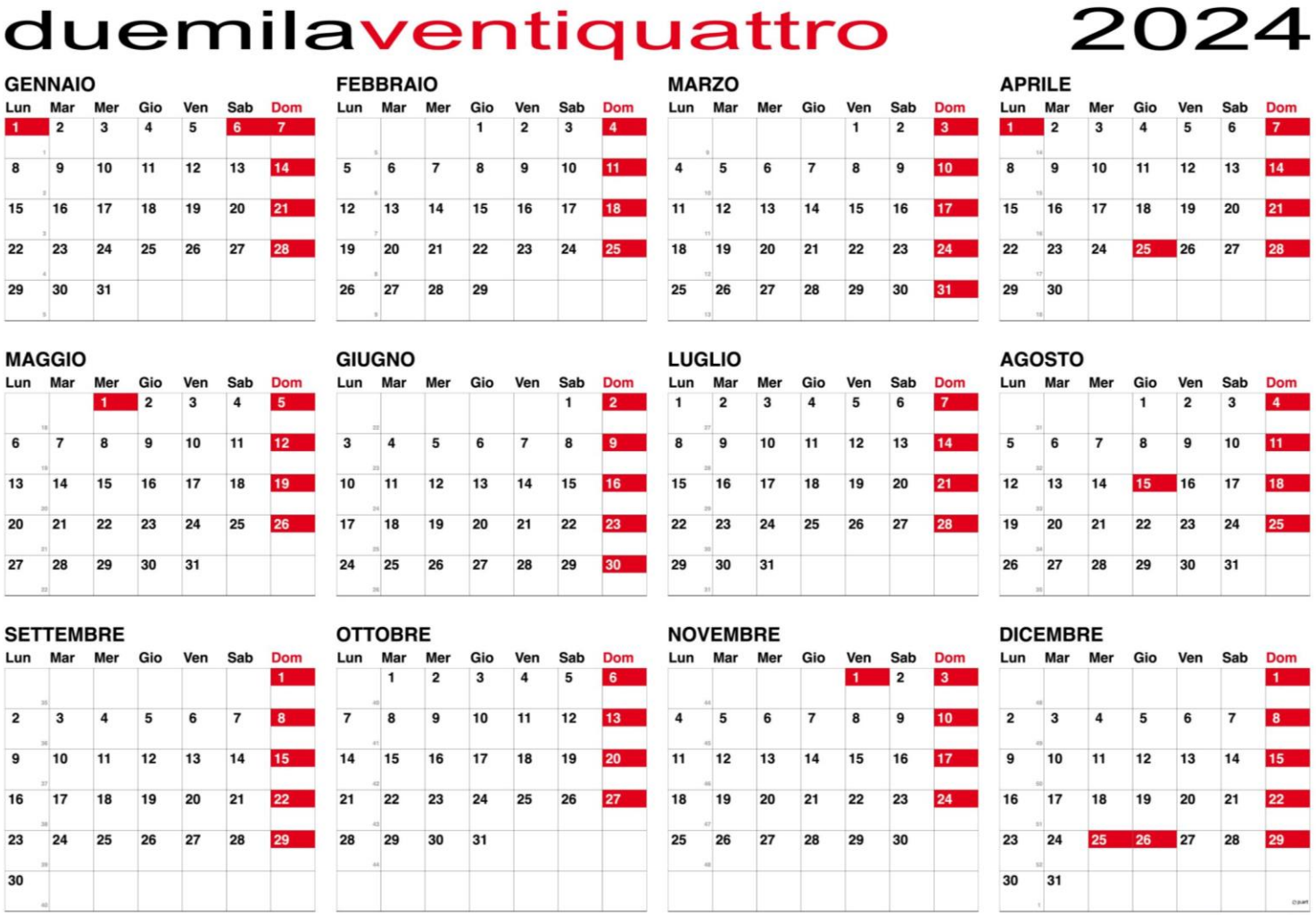
- Dipartimento di Scienze e Vita, Unimore (Prof M.Rossi, Prof F.Pellati, Dott. S.Raimondi)
- Dipartimento di Scienze Mediche e Chirurgiche Materno-Infantili e dell'Adulto, Unimore (Prof. U.Chiarini, Prof .A.Anesi, Dott. R.Salvatori)
- Dipartimento di Dipartimento di Chimica & Centro Interdipartimentale, "Nanostructured Interfaces and Surfaces" – NIS, Unito (Prof. G.Cerrato)
- Dipartimento di Scienze della Salute, UPO, (Prof Lia Rimondini, Dott. A.Cochis)
- University of Erlangen-Nuremberg-Germany (Prof. Dr.-Ing. habil. Aldo R. Boccaccini)
- Universidad Complutense Madrid, Spain (Prof. A. Salinas, M.Vallet-Regi)
- University of Surrey, Guildford, UK (Prof D. Carta)



UNIMORE
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