

Laura Russo



<https://bioorgunimib.com/btbs/>



<https://it.linkedin.com/in/laurarusso2>

- *Chimica per le Nanotecnologie Biomediche* (Magistrale Chimica)
- *Laboratorio di chimica organica* (Triennale Biotech e Biologia)
- *Patient-Derived in vitro Glioma Models: from patients to dish to 3D bioprinting technology* (PhD Neuroscienze)

University of Milano–Bicocca



Biorganic Chemistry Lab



3D Bioprinting and Formulation Lab

University of Galway - Ireland



Department of Chemistry

Cùram - Center of Excellence on Medical Devices

Biocompatibility Innovation Partner and Advisory Board



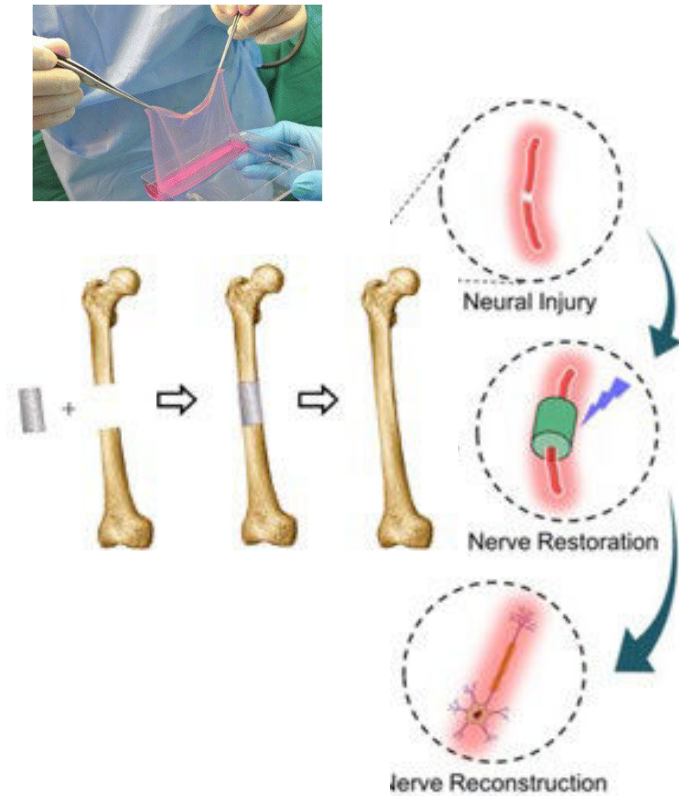
RESYDE

Founder

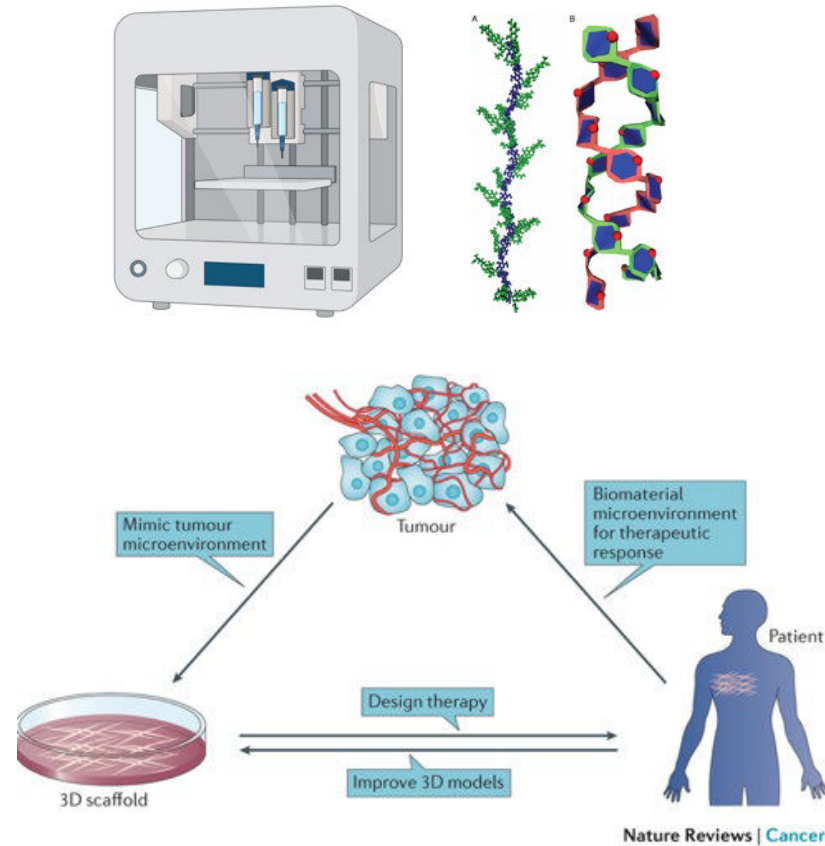


Bioorganic Chemistry in Medicine

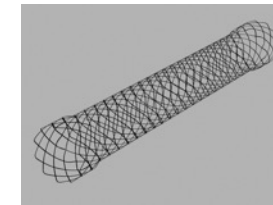
Regenerative Medicine



3D in Vitro Models

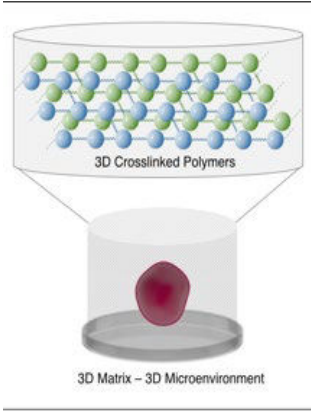


Medical devices and biosensors



Polymers and Signaling Molecules

Crosslinking

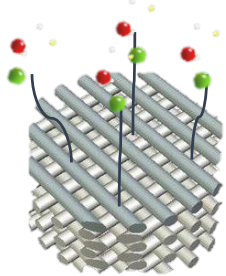


Proteins **Synthetic Polymers** **Polysaccharides**

The diagram shows three types of crosslinking: 1) Proteins: individual protein chains (represented as blue and red lines) crosslinking into a network. 2) Synthetic Polymers: a linear polymer chain with a repeating unit of a carbon-carbon backbone and side groups (represented by red and black spheres) crosslinking. 3) Polysaccharides: two chemical structures of polysaccharides. The first is a repeating unit of a polymer with hydroxyl and amide groups. The second is a branched structure with multiple amide and hydroxyl groups, illustrating crosslinking points.

Functionalization

Scaffold

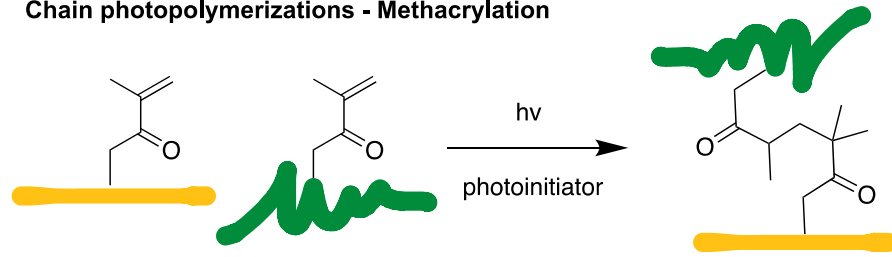


Different substrates **Bioactive Molecules**

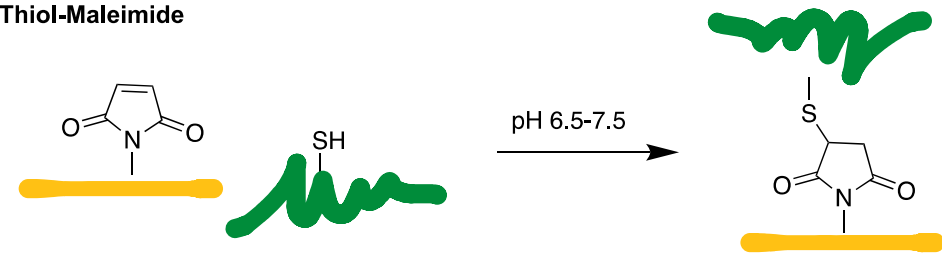
Proteins **Synthetic Polymers** **Glycans** **Peptides**

The diagram illustrates functionalization on four different substrates: 1) Proteins: individual protein chains with functional groups (represented by colored spheres) being attached to a scaffold. 2) Synthetic Polymers: a linear polymer chain with functional groups being attached to a scaffold. 3) Glycans: a complex branched glycan structure with various sugar units (represented by colored diamonds and circles) and their linkages (e.g., β 1,3, β 1,4, β 1,6) being attached to a scaffold. 4) Peptides: a chemical structure of a peptide chain with various amino acid side chains (including a guanidino group) being attached to a scaffold.

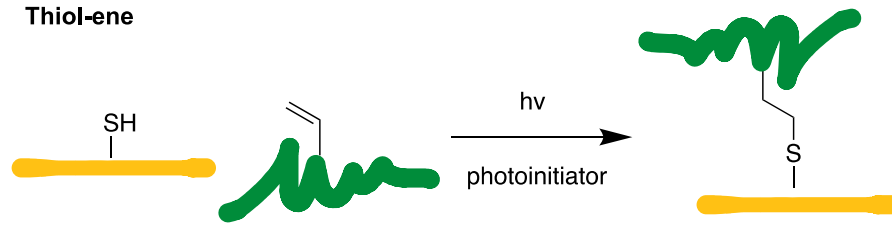
Chain photopolymerizations - Methacrylation



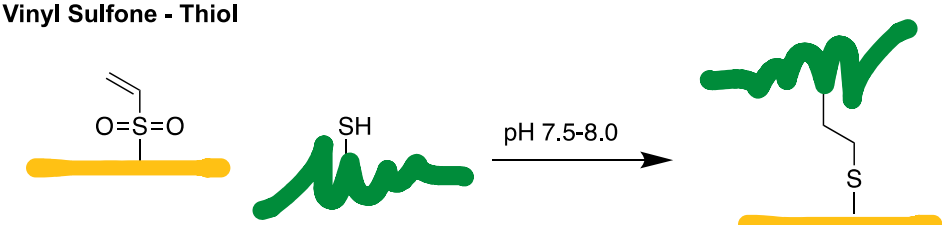
Thiol-Maleimide



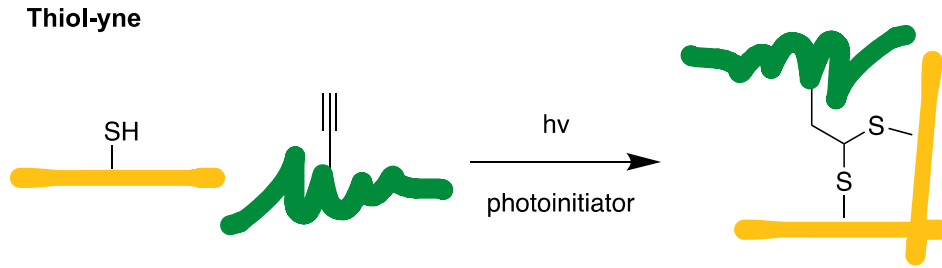
Thiol-ene



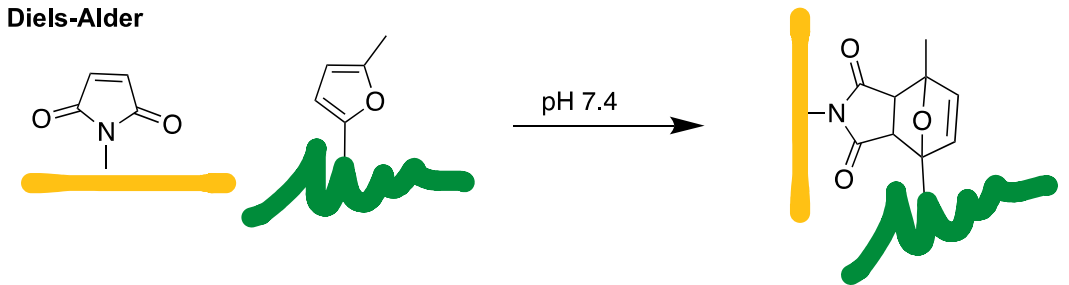
Vinyl Sulfone - Thiol



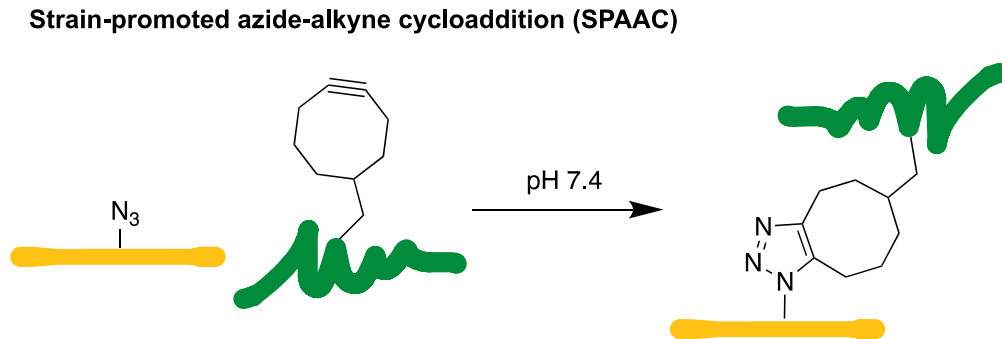
Thiol-yne



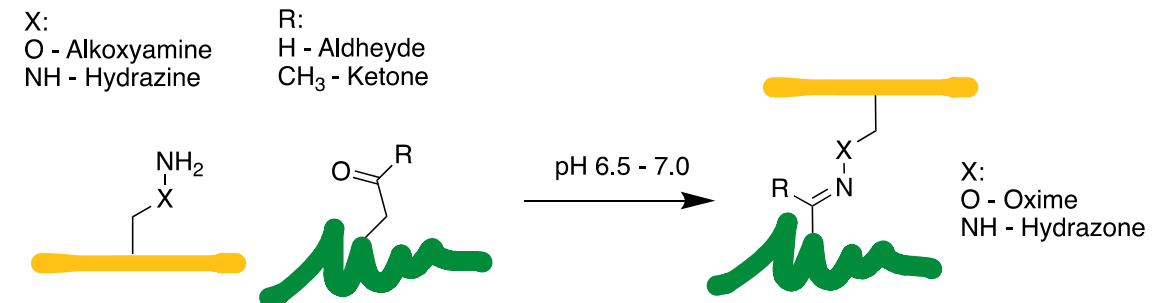
Diels-Alder



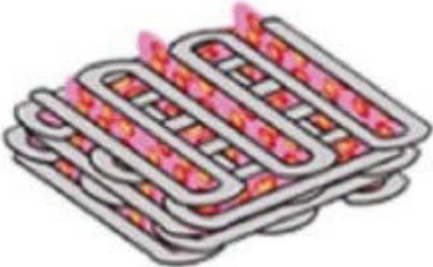
Strain-promoted azide-alkyne cycloaddition (SPAAC)



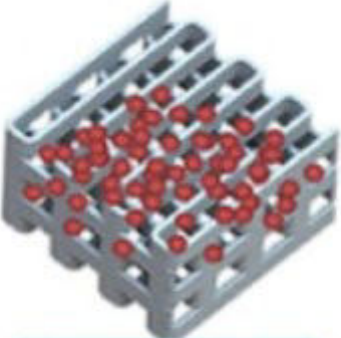
Oxime and Hydrazone ligation



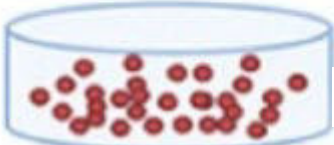
Manufacturing and formulation



3D bio-printed models



3D printed models



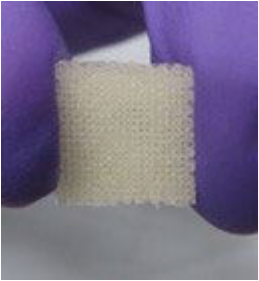
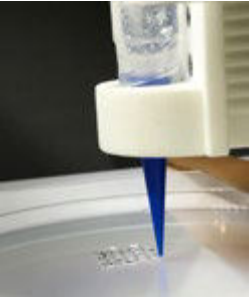
Culture in 3D fibrous scaffolds



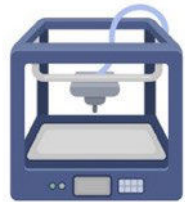
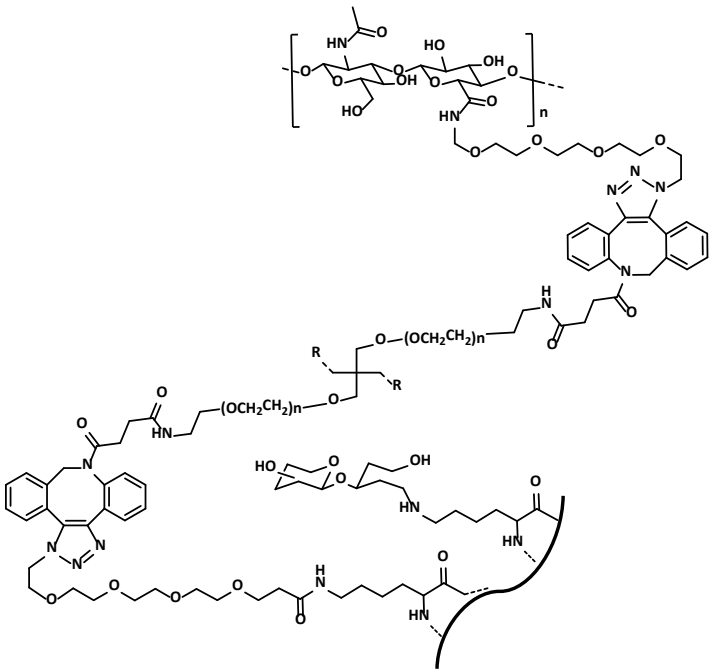
Culture in 3D porous scaffolds



Culture in hydrogel



Projects – Artificial Tissues



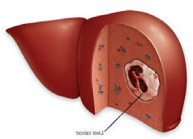
3D BioPrinting Set-Up



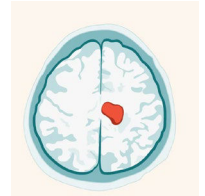
Colon cancer



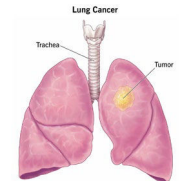
Gastric cancer



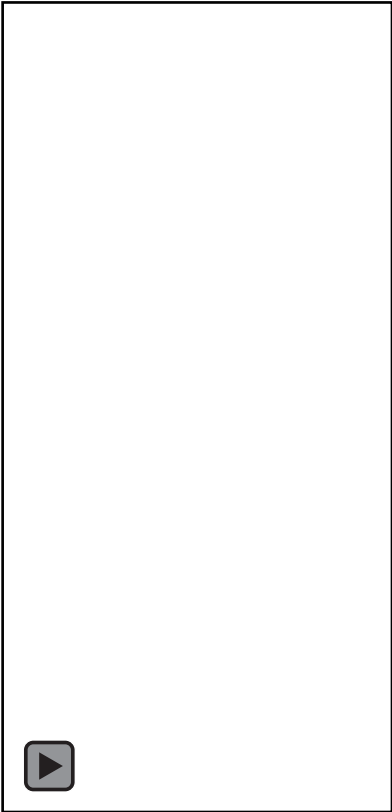
Liver cancer



Brain cancer



Lung cancer



Projects – Regenerative Medicine



Nervous system



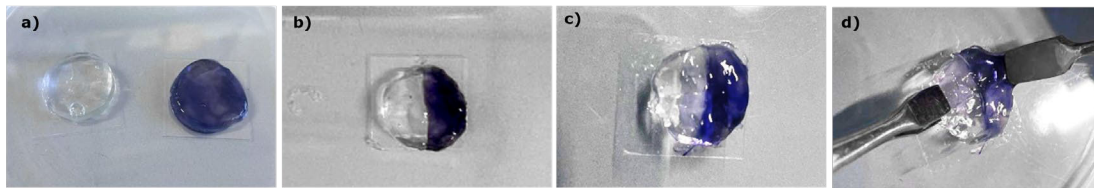
Osteochondral system



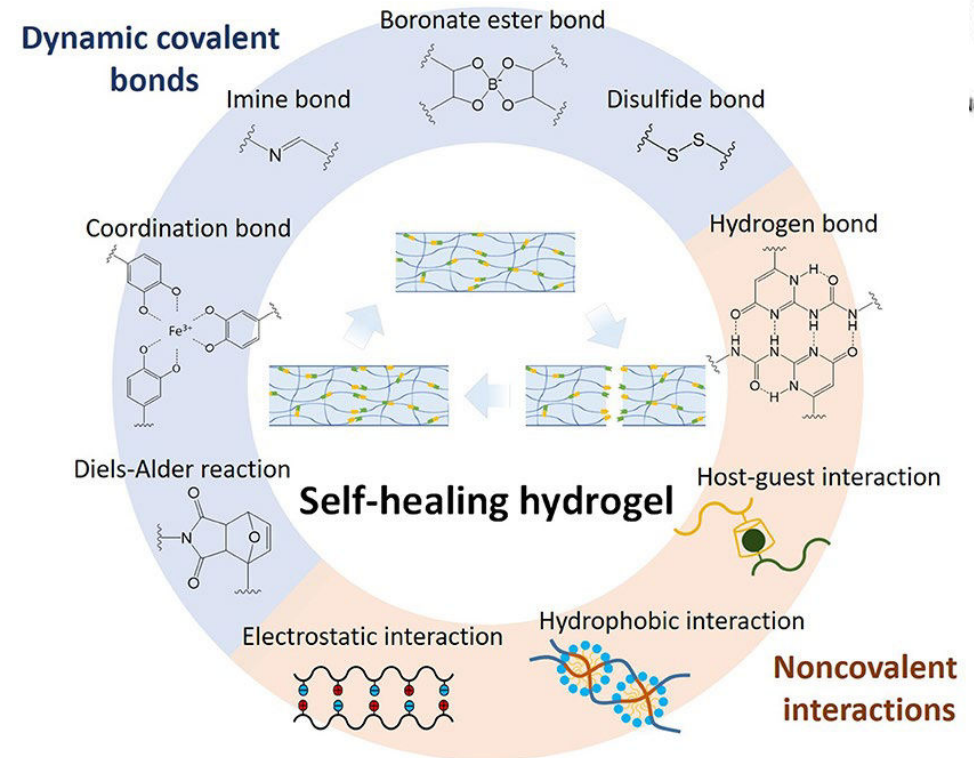
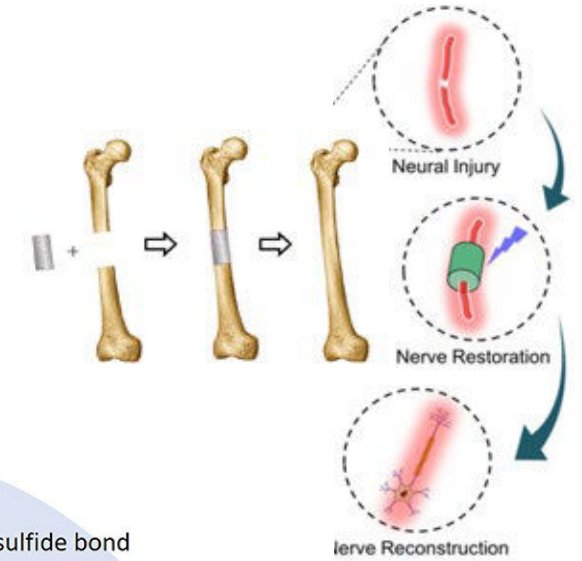
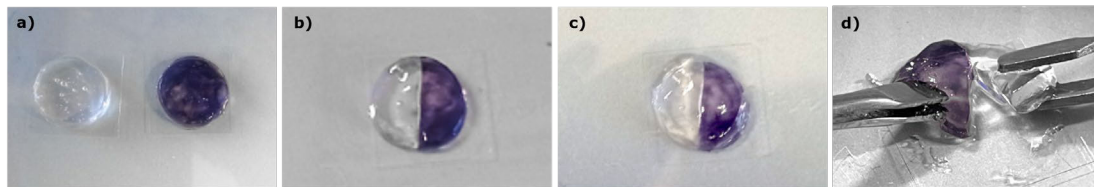
Artificial Organs and Tissues

- Injectable hydrogels
- Dynamic and self assembled polymers
- Smart Biomaterials

Alg-Tyr-3APBA-Gel-d

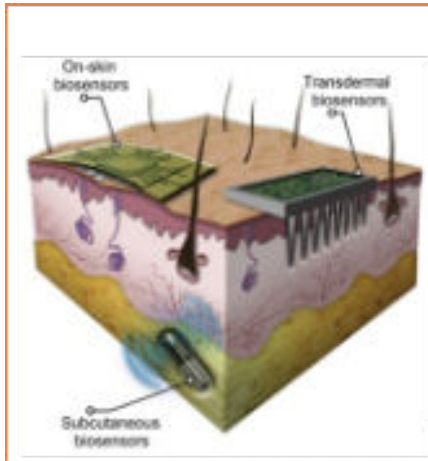


Alg-Tyr-Gel



Projects - Biosensors

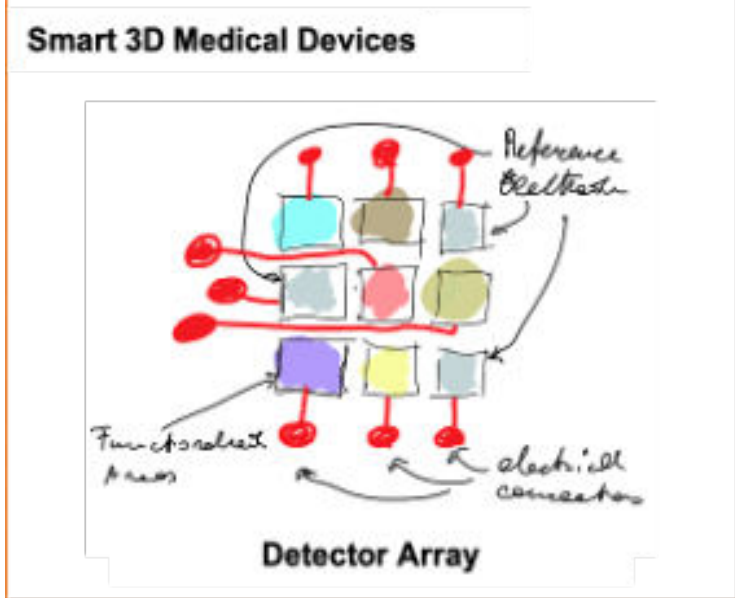
In collaboration with Prof. Sanguinetti – Department of Material Science



Chemical and Biochemical sensing

- Glucose
- Cholesterol
- pH / ions
- Microbial infection
- Inflammation

Smart 3D Medical Devices




Detector Array

Reference Electrodes

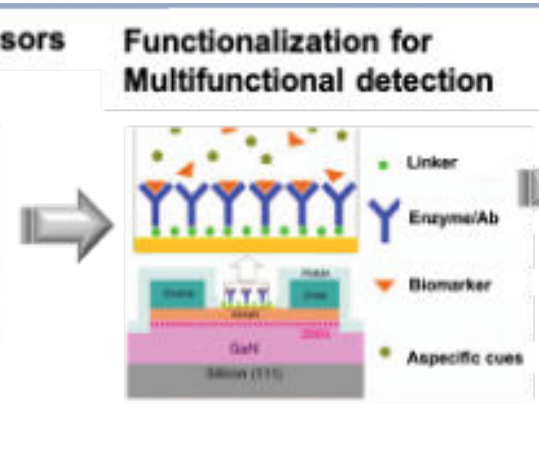
Functionalized Areas

Electrical connections

Potentiometric Biosensors



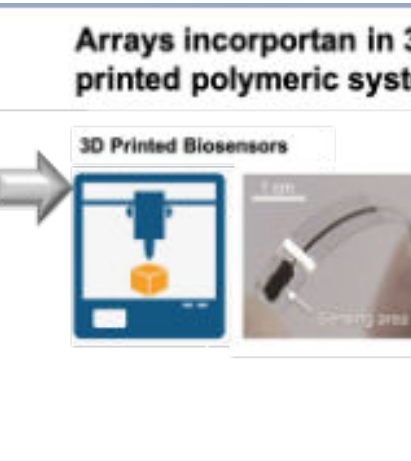
Functionalization for Multifunctional detection



- Linker
- Enzyme/Ab
- Biomarker
- Specific cues

Arrays incorporated in 3D printed polymeric systems

3D Printed Biosensors



Polysaccharide

Teflon

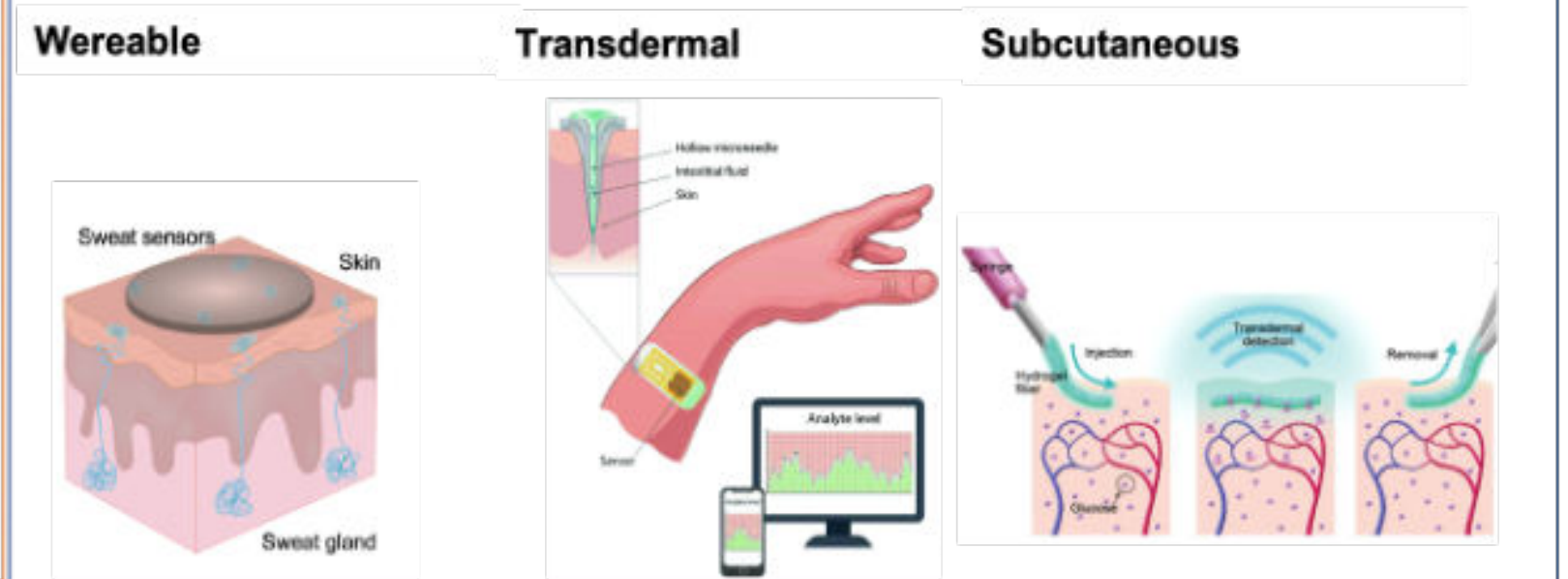
Microstructured Polysaccharide

Sensor Array

Wearable

Transdermal

Subcutaneous



Sweat sensors

Skin

Sweat gland

Hollow microneedle

Insulating fluid

Skin

Sensor

Analyte level

Hydrogel fiber

Injection

Transdermal detection

Removal

Chromite

Projects – medical devices

Medical devices coating

- Conjugation of antiadhesive polymers
- Coating with antimicrobial polymers

