



POLITECNICO
MILANO 1863

DIPARTIMENTO DI CHIMICA,
MATERIALI E INGEGNERIA CHIMICA
GIULIO NATTA

BIOMATERIALS FOR REGENERATIVE MEDICINE: WHERE ARE WE HEADED?

Sezione di Ingegneria Biologica

Silvia Farè

MY JOURNEY

**Master
thesis @**
JRC Ispra,
CMIC Dept

**PhD thesis
@ CMIC**
Dept, BIO
Dept

**PostDoc
fellowship
@ BIO**
Dept

**Research
fellowship
@ BIO**
Dept

RTI @ BIO
Dept,
CMIC Dept

PA @
CMIC Dept

PO @
CMIC Dept



MY RESEARCH TOPICS

JOURNAL OF MATERIALS SCIENCE: MATERIALS IN MEDICINE 7 (1996) 471-474

Tribological behaviour of Ti6Al4V modified by surface treatments

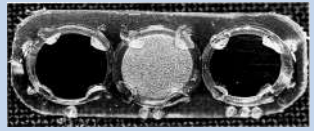
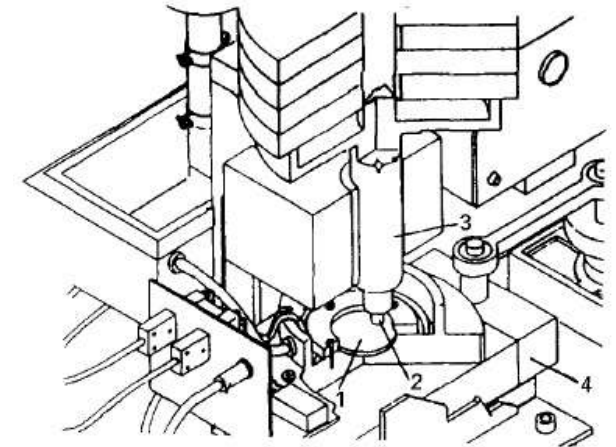
F. BROSSA

Institute for Advanced Materials, JRC, Ispra (VA), Italy

A. CIGADA, S. FARÈ, R. CHIESA, L. PARACCHINI

Dip. Chimica - Fisica Applicata, Politecnico di Milano, Milano, Italy

Journal of Applied Biomaterials & Biomechanics 2003; 1: 131-138



Ti alloy surface modification for improving wear behaviour or bacteria interaction

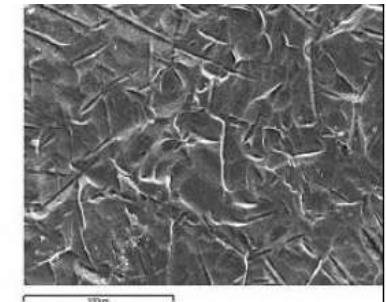
The effect of composition, wettability and roughness of the substrate on *in vivo* early bacterial colonization of titanium

L. RIMONDINI¹, S. FARÈ², R. CHIESA³, M.P. PEDEFERRI¹, A. CARRASSI¹

¹Department of Oral Pathology and Medicine, University of Milano - Italy

²Biomaterials Laboratory, Department of Bioengineering

³Department of Chemistry, Materials and Chemical Engineering "Giulio Natta", Politecnico di Milano, Milano - Italy



Industrial material adaptation

Design of passive materials

MY RESEARCH TOPICS



Ti alloy surface
modification for
improving wear
behaviour or
bacteria
interaction



design,
processing and
characterization
of polymers for
cardiovascular
applications

Industrial
material
adaptation

Design of
passive
materials



Synergistic effects of oxidative environments and mechanical stress on *in vitro* stability of polyetherurethanes and polycarbonateurethanes

Silvia Faré,¹ Paola Petrini,¹ Antonella Motta,² Alberto Cigada,³ Maria Cristina Tanzi¹

¹Dipartimento di Bioingegneria, Politecnico di Milano, Piazza Leonardo da Vinci 32, 20133 Milan, Italy

²Stazione Sperimentale per la Seta, via G. Colombo 81, 20133, Milan, Italy

³Dipartimento di Chimica-Fisica Applicata, Politecnico di Milano, Piazza Leonardo da Vinci 32, 20133 Milan, Italy

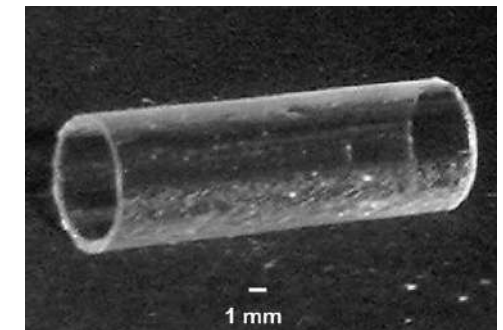
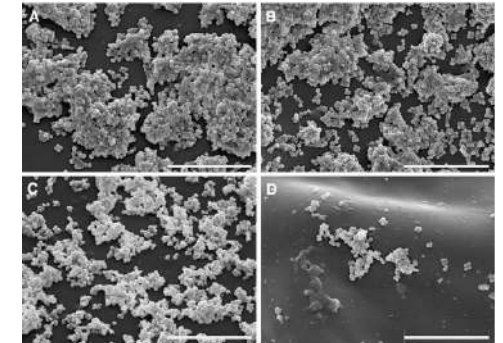
Received 24 April 1998; accepted 17 September 1998

The International Journal of Artificial Organs / Vol. 28 / no. 7, 2005 / pp. 701-710

Bioengineering and Nanotechnology

Materials characterization of explanted mechanical heart valves and comparison to patients' clinical data

S. FARÉ¹, M.F. BRUNELLA², G. BRUSCHI³, A. CIGADA², E. VITALI³



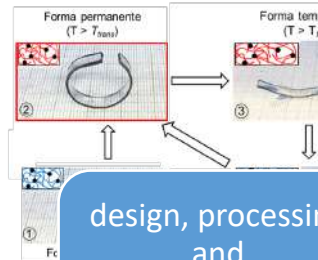
MY RESEARCH TOPICS



Ti alloy surface modification for improving wear behaviour or bacteria interaction



design, processing and characterization of polymers for cardiovascular applications



design, processing and characterization of shape memory polymers for reparative medicine



Available online at www.sciencedirect.com

ScienceDirect

Acta Biomaterialia 5 (2009) 1508–1518



Shape memory polymer foams for cerebral aneurysm reparation: Effects of plasma sterilization on physical properties and cytocompatibility

Luigi De Nardo^{a,*}, Rachele Alberti^b, Alberto Cigada^a, L'Hocine Yahia^c, Maria Cristina Tanzi^b, Silvia Farè^b

^a Dipartimento di Chimica, Materiali e Ingegneria Chimica, "G. Natta", Politecnico di Milano, Via Mancinelli 7, 20133 Milan, Italy
^b Biomaterials Laboratory, Bioengineering Department, Politecnico di Milano, Piazza Leonardo da Vinci 32, 20133 Milan, Italy
^c Institute of Biomedical Engineering, École Polytechnique de Montréal, Montréal, QC, Canada

J Appl Biomater Funct Mater 2012; Vol. 10 no. 2, 119–126
DOI: 10.5301/JABFM.2012.9706

ORIGINAL ARTICLE

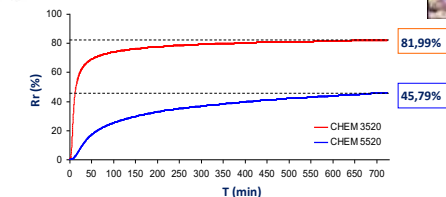
Preparation and characterization of shape memory polymer scaffolds via solvent casting/particulate leaching

Luigi De Nardo¹, Serena Bertoldi², Alberto Cigada¹, Maria Cristina Tanzi², Håvard Jostein Haugen³, Silvia Farè²

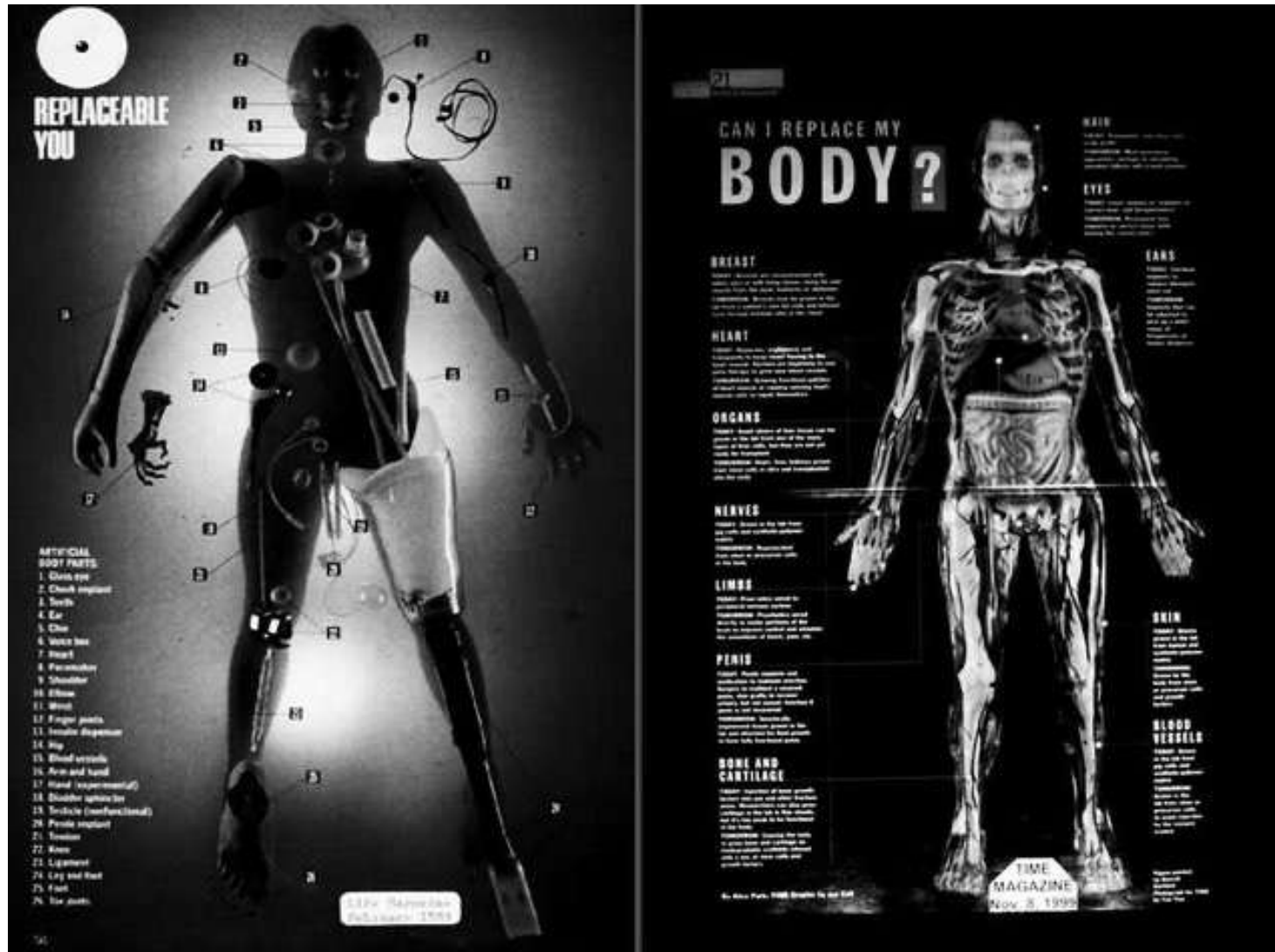
¹Department of Chemistry, Materials, and Chemical Engineering "G. Natta", Politecnico di Milano, Milano - Italy

²Biomaterials Laboratory, Department of Bioengineering, Politecnico di Milano, Milano - Italy

³Biomaterials Department, Institute for Clinical Dentistry, University of Oslo, Oslo - Norway



MY RESEARCH TOPICS



MY RESEARCH TOPICS



Ti alloy surface modification for improving wear behaviour or bacteria interaction



Biodegradable microgrooved polymeric surfaces obtained by photolithography for skeletal muscle cell orientation and myotube development

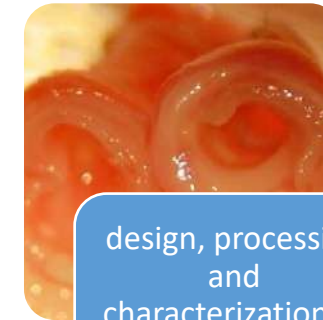
L. Altomare^{a,*}, N. Gadegaard^b, L. Visai^{c,d}, M.C. Tanzi^a, S. Farè^a

^aBioMatLab, Bioengineering Department, Politecnico di Milano, 20133 Milan, Italy
^bCentre for Cell Engineering, University of Glasgow, Glasgow G12 8LT, United Kingdom
^cBiochemistry Department, University of Pavia, 27100 Pavia, Italy
^dCentre for Tissue Engineering (CTE), University of Pavia, 27100 Pavia, Italy

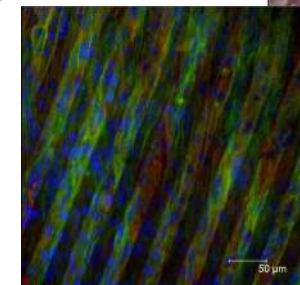
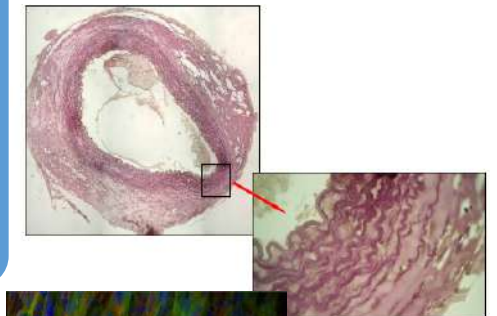
J Mater Sci: Mater Med (2010) 21:1005–1011
 DOI 10.1007/s10856-009-3953-4

Ability of polyurethane foams to support placenta-derived cell adhesion and osteogenic differentiation: preliminary results

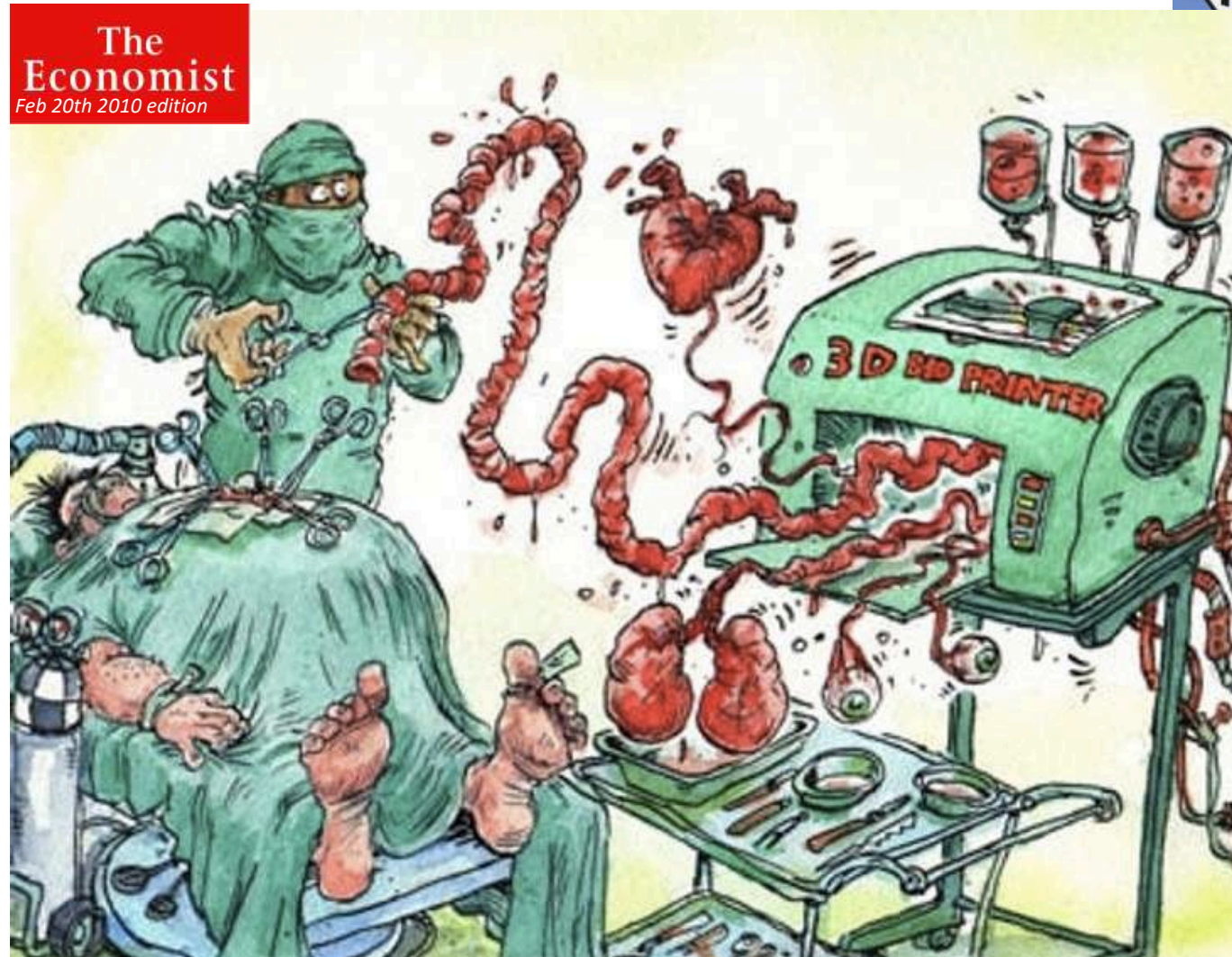
S. Bertoldi • S. Farè • M. Denegri • D. Rossi •
 H. J. Haugen • O. Parolini • M. C. Tanzi



design, processing and characterization of polymers for regenerative medicine (hard&soft tissues)



MY RESEARCH TOPICS



MY RESEARCH TOPICS

frontiers
in Immunology

ORIGINAL RESEARCH
published: 03 May 2021
doi: 10.3389/fimmu.2021.639572

3D Bioprinting Allows the Establishment of Long-Term 3D Culture Model for Chronic Lymphocytic Leukemia Cells

Francesca Vittoria Sbrana¹, Riccardo Pinos^{1,2}, Federica Barbaglio¹, Davide Ribezzi^{1,3}, Fiorella Scagnoli¹, Lydia Scarfo^{2,4}, Itedale Namro Redwan⁵, Hector Martinez⁵, Silvia Farè², Paolo Ghia^{2,4} and Cristina Scielzo^{1*}

Biofabrication 12 (2020) 025001

<https://doi.org/10.1088/1758-5090/ab5619>

Biofabrication

PAPER

Three-dimensional printing of chemically crosslinked gelatin hydrogels for adipose tissue engineering

Nicola Contessi Negrini^{1,2,3}, Nehar Celikkin¹, Paolo Tarsini², Silvia Farè^{2,3,4} and Wojciech Świączkowski^{1,4}

¹ Warsaw University of Technology, Faculty of Materials Science and Engineering, 141 Wolska Street, Warsaw, Poland

² Department of Chemistry, Materials and Chemical Engineering "G. Natta", Politecnico di Milano, Piazza Leonardo da Vinci 32, Milan, Italy

³ INSTM, National Consortium of Materials Science and Technology, Local Unit Politecnico di Milano, Piazza Leonardo da Vinci 32, Milan, Italy

J Mater Sci: Mater Med (2016) 27:95
DOI 10.1007/s10856-016-5703-8

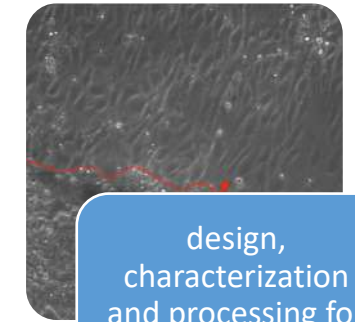
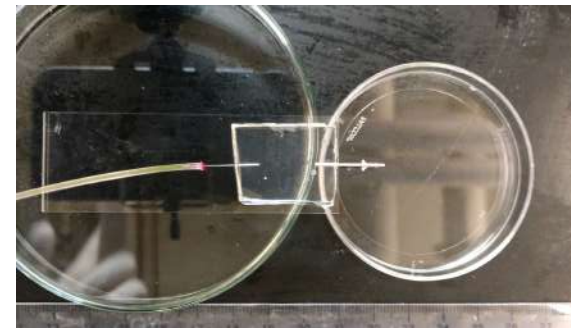
TISSUE ENGINEERING CONSTRUCTS AND CELL SUBSTRATES

Thermo-responsive methylcellulose hydrogels as temporary substrate for cell sheet biofabrication

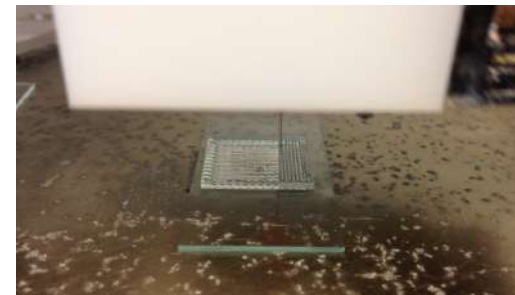
Lina Altomare^{1,2}, Andrea Cochis^{3,4}, Andrea Carletta¹, Lia Rimondini^{3,4}, Silvia Farè^{1,2}



Ti alloy surface modification for improving wear behaviour or bacteria interaction



design, characterization and processing for advanced applications in regenerative medicine



Industrial material adaptation

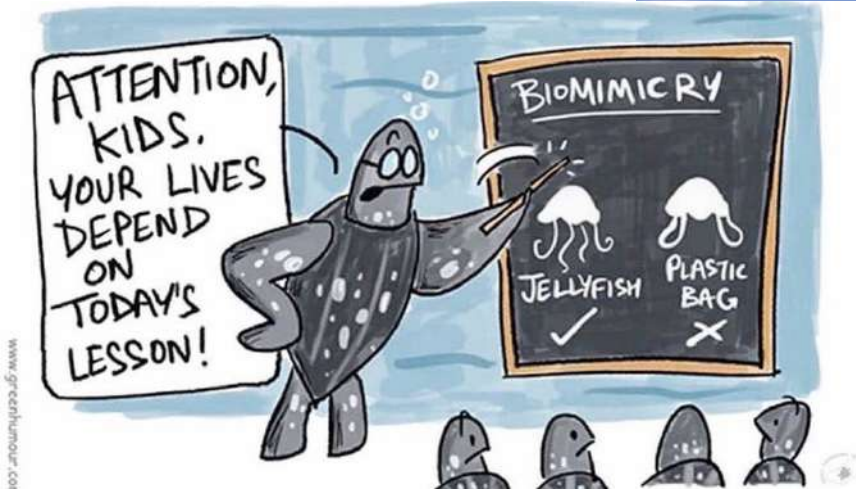
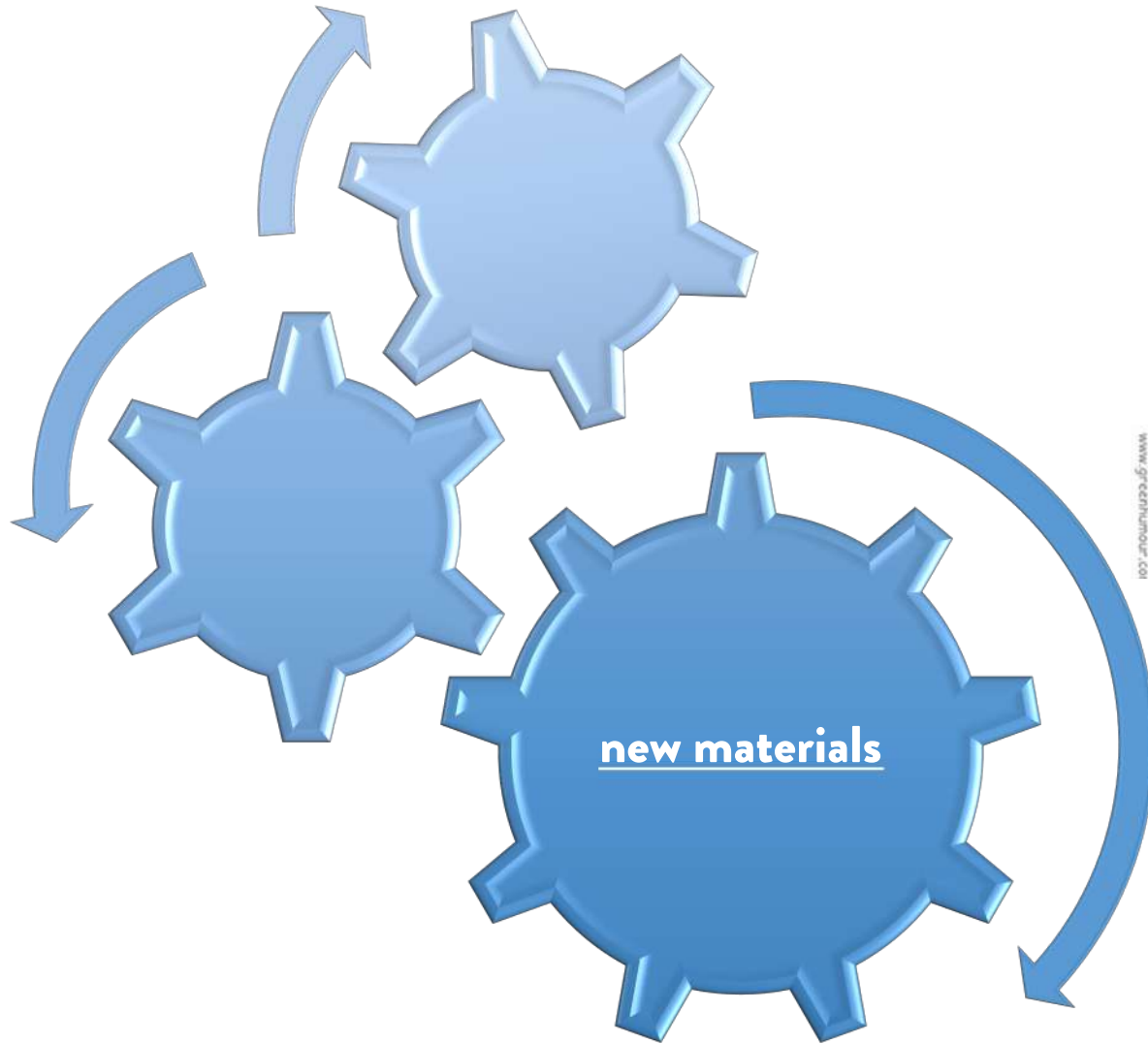
Design of passive materials

Design of bioactive & degradable materials

Self-assembling materials

Constructive remodelling materials

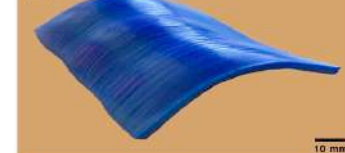
WHERE ARE WE NOW AND WHERE WOULD WE GO?



(a)



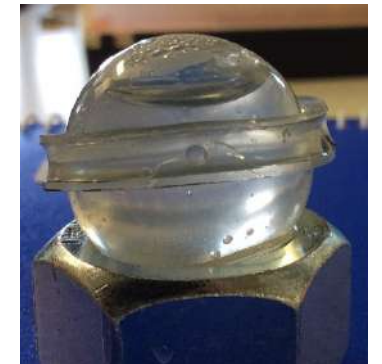
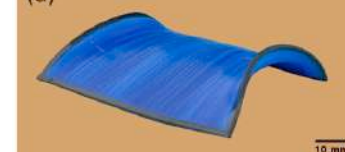
(b)



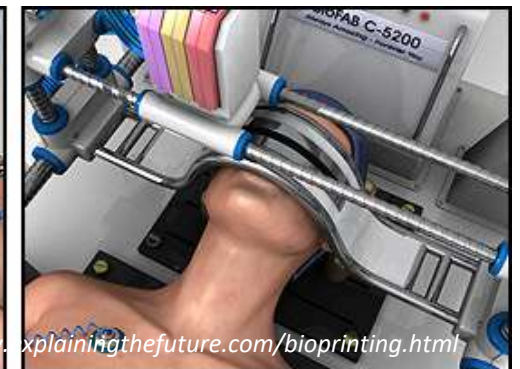
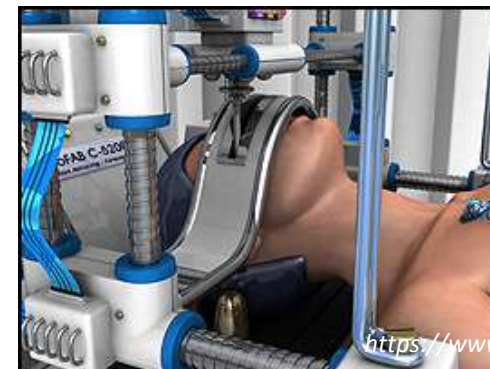
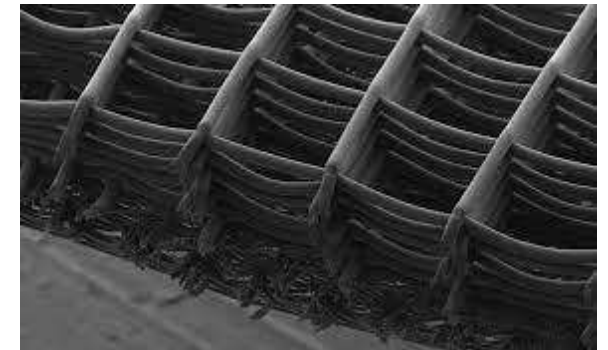
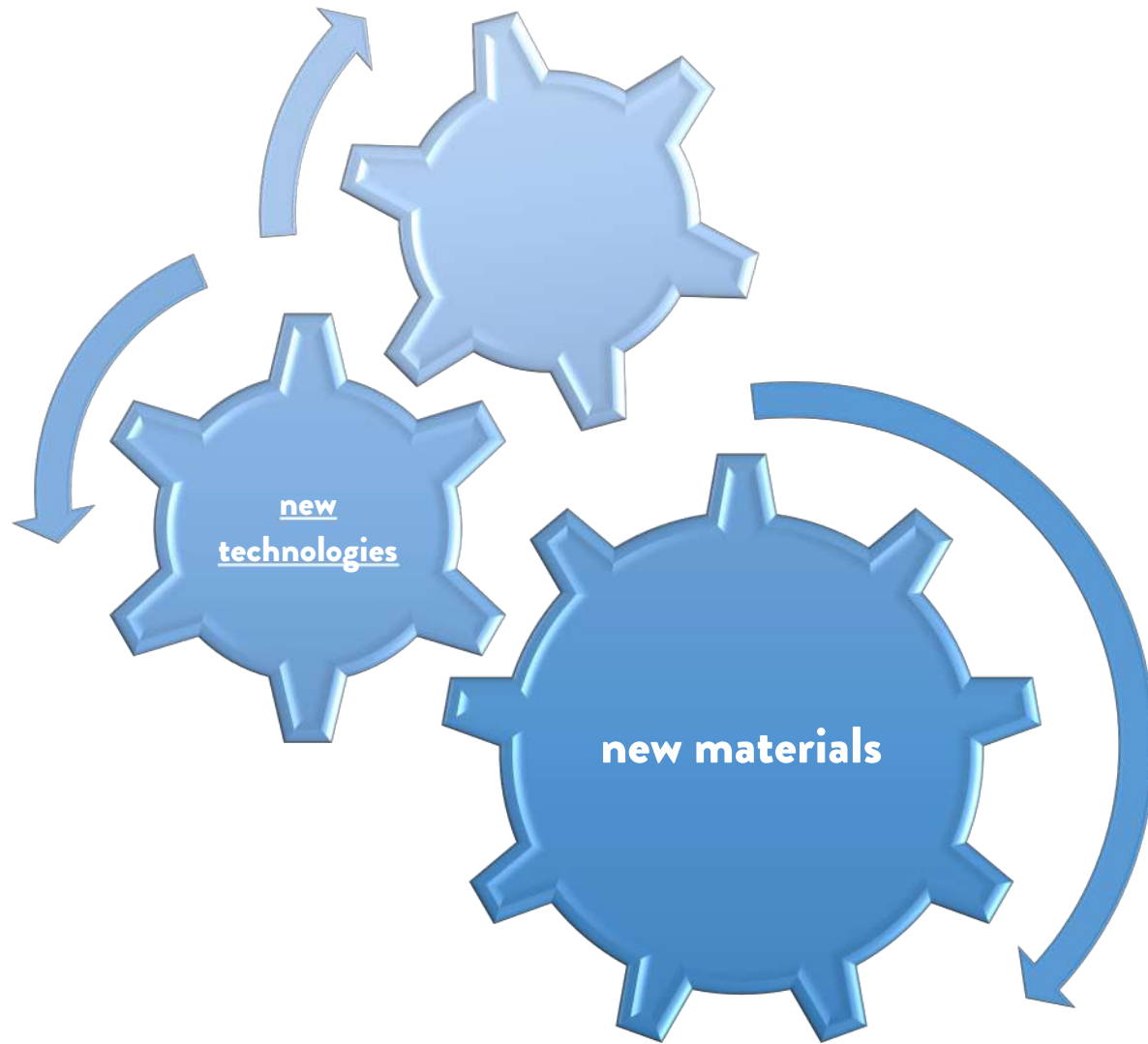
(c)



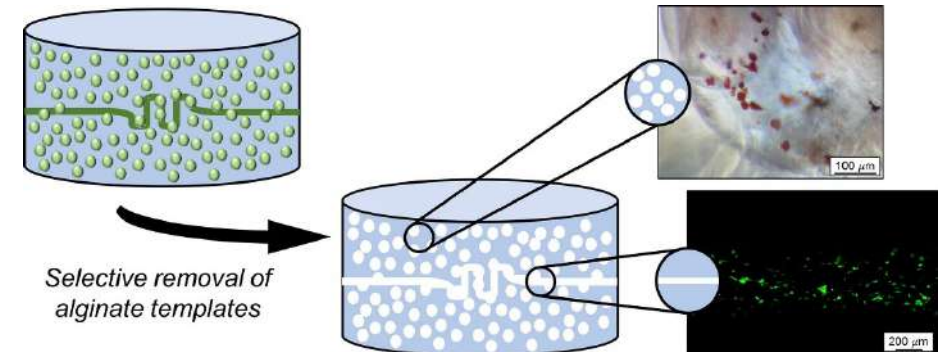
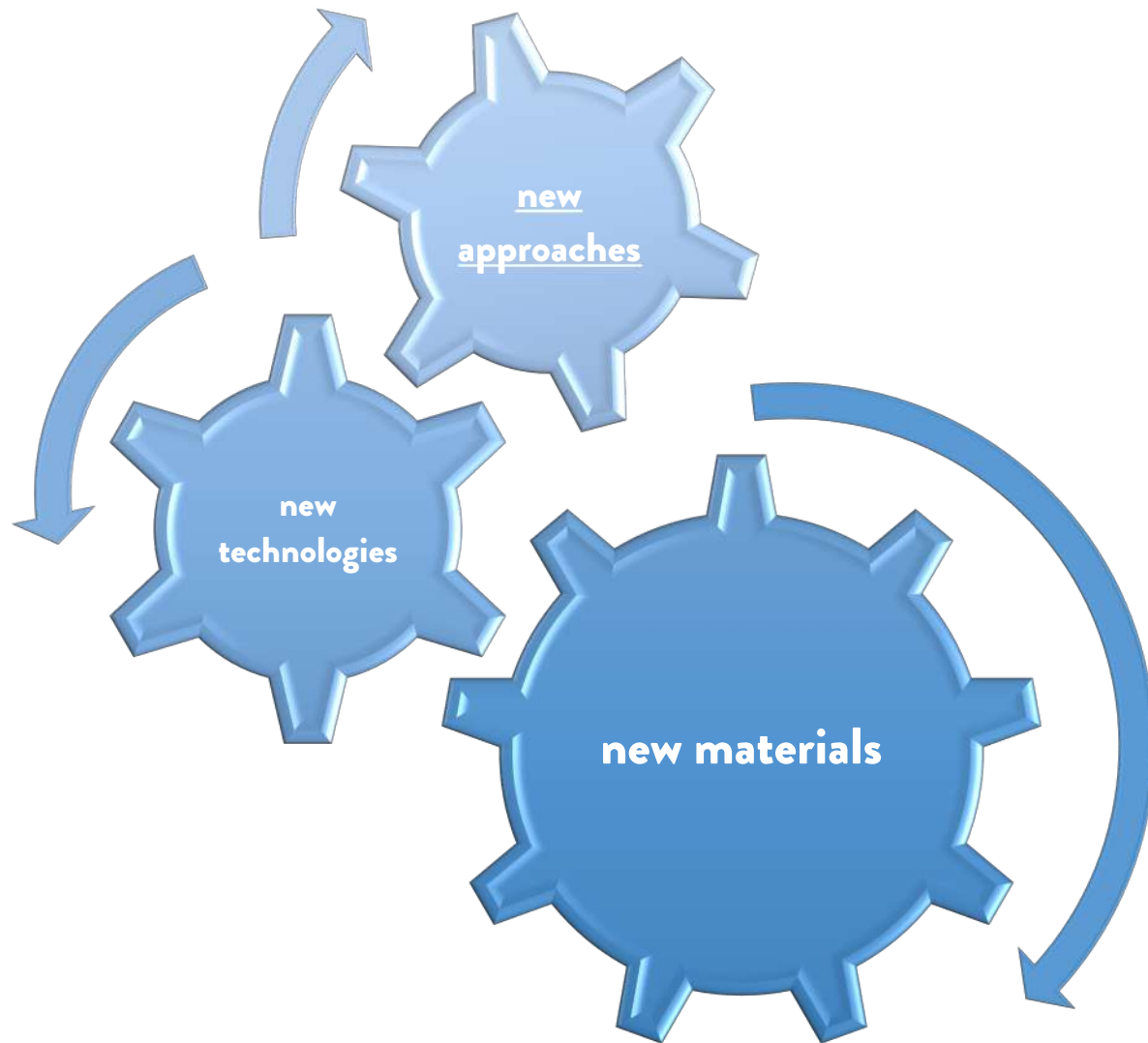
(d)



WHERE ARE WE NOW AND WHERE WOULD WE GO?



WHERE ARE WE NOW AND WHERE WOULD WE GO?



EDUCATION

- soft skills
- interaction with other actors involved in the biomedical engineering
- improve knowledge (and curiosity) in emerging fields
- their future?

ADVICE



SUPPORT



HELP



TIPS



GUIDANCE



ASSISTANCE





THIRD MISSION

- ✓ starting from
 - ✓ collaboration with industries and research centres
 - ✓ innovative ideas
- innovative start up and spin off on specific topics
 - S2P participation
- Italian grants
 - PRIN
 - CARIPLO
 -
- Call in Europe



THANKS FOR YOUR ATTENTION

silvia.fare@polimi.it

*un obiettivo è un sogno con un punto d'arrivo
(D. Ellington)*

POLITECNICO MILANO 1863