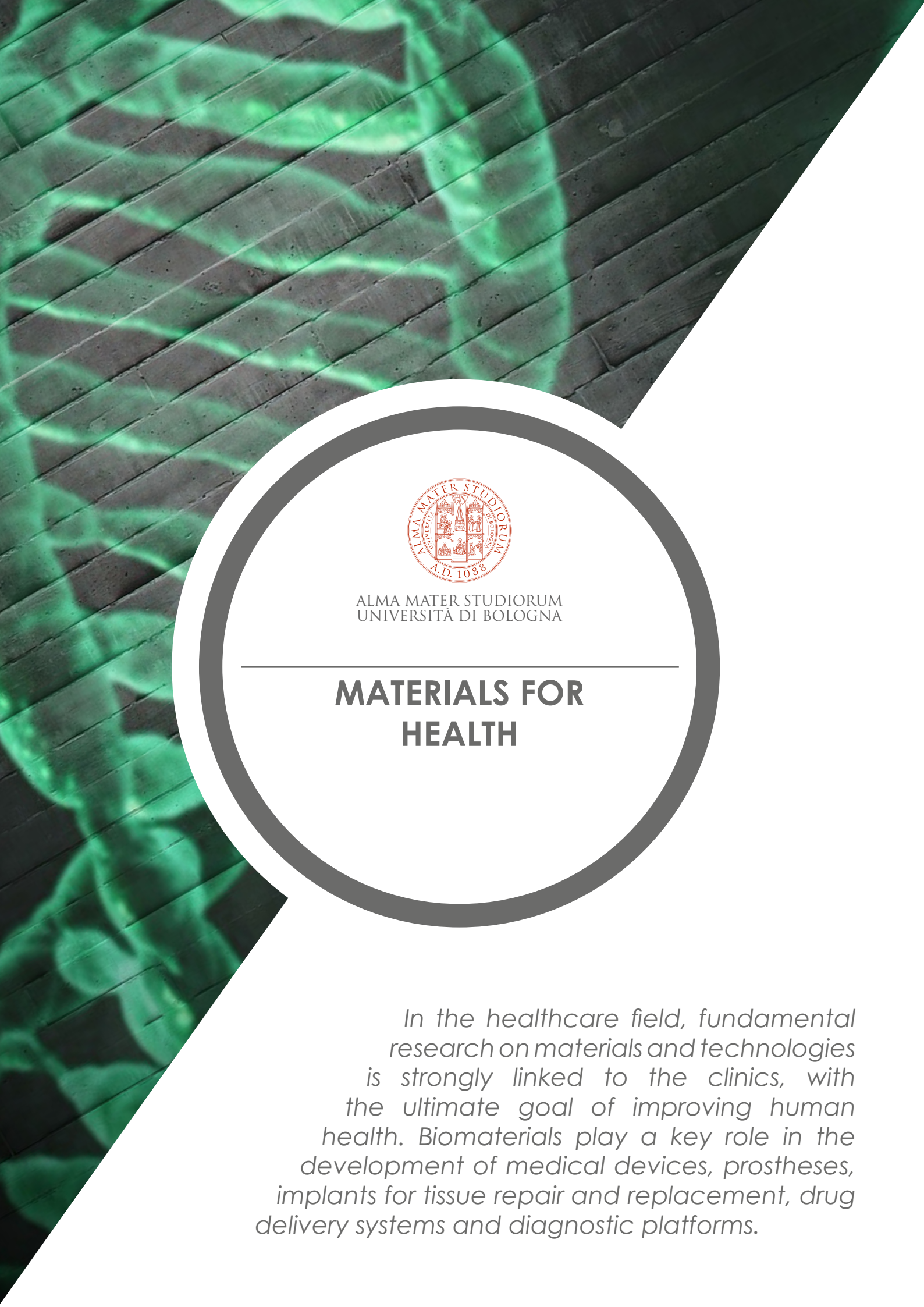

ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

MATERIALS FOR HEALTH

In the healthcare field, fundamental research on materials and technologies is strongly linked to the clinics, with the ultimate goal of improving human health. Biomaterials play a key role in the development of medical devices, prostheses, implants for tissue repair and replacement, drug delivery systems and diagnostic platforms.

The world-leading research of the University of Bologna on materials for health is carried out in several areas, driven in a multidisciplinary way, including theoretical modelling, novel synthesis processes, and advanced characterization techniques. –The research vision includes projects addressing specific clinical needs, and exploiting collaboration among clinicians, biologists, biochemists, physicists, chemists and engineers. The research of the University of Bologna covers a wide range of issues:

- A main application area is covered by tissue engineering: development of 'soft' materials as scaffolds for neural conduits, dermal grafts, cardiovascular patches, etc.; 'hard' materials as scaffolds for bone and osteochondral regeneration; strategies affording prevascularized cell-based constructs for myocardial tissue engineering are also developed
- Hybrid biomimetic scaffolds
- Functionalized biomimetic micro- and nano-crystals of calcium phosphates for bone tissue repair. Calcium phosphate bone cements as orthopedic implant materials
- Natural polymers-based scaffolds (collagen, gelatin, chitosan, alginate, etc.)
- Materials and strategies for wound healing
- Investigation of the mechanobiology of cancer cell–ECM interaction through 3D scaffolds
- Materials for pharmaceuticals and personal care
- Drug delivery systems. Controlled drug delivery. Local drug delivery
- Imaging and diagnosis of living systems
- Engineering surfaces of implants (titanium etc.) to avoid biofilm infections. Inherently bactericidal surfaces. Anti-infective and anti-microbial materials
- Biomimetic coatings, surface functionalization of biomaterials
- Smart materials: shape memory polymeric biomaterials. Stimuli responsive biomaterials. Thermo-responsive hydrogels
- Macromolecular hydrogels. Peptide-based hydrogels
- Electrospinning and electrospraying for nanofibers and nanoparticles fabrication
- Electroactive polymers (EAPs) for artificial muscles: conducting polymers, dielectric elastomers, piezoelectric polymers
- Materials and devices for orthopedic, trauma and dental implants inducing proper osteointegration (titanium, polymeric materials, micro-nanostructured materials, functionalized materials)
- Materials for implants in the brain and in spinal cord injuries
- Bioinspired surfaces for bio-diagnostics and drug discovery devices
- Magnetic scaffolds for tissue regeneration
- Polymeric biomaterials for 3D printing and 3D bioprinting of scaffolds for organ engineering

HIGHLIGHTS

Biomimetic Materials and scaffolds for tissue engineering: functional polymeric biomaterials from electrospinning: nanofibres for tissue engineering and drug delivery.
Electroactive polymers for artificial muscles: conducting polymers, dielectric elastomers, piezoelectric polymers.
Development of materials for **orthopaedics and dental implants**.