



PhD Research Proposal

Title: “Design, micro-fabrication and mechanical characterization of soft interfaces for optimal interfacial adhesion”

Scholarship: about 20 k€/year (according to Italian law, scholarship increases by 50 % for periods abroad)

Project Duration: 3 years

Supervisor: [Prof. Antonio Papangelo](#)

University: Department of Mechanics (DMMM) Politecnico di Bari – Department of Bioscience, University of Bari

Research topic

We are looking for a brilliant mechanical engineer (or alike) who is keen to work in the field of soft contact mechanics by using numerical as well as experimental methods. The PhD research proposal aims at developing numerical and experimental techniques for designing micro-structured reversible adhesive surfaces. The research goals are relevant in the field of human science and soft robotics. In particular there is a urgent need of bioinspired and bio-degradable adhesive patches for tissue re-attachment after injuries. Tissue alterations due to ageing is one of the main causes of detachment (lost of intimate adhesion) between different layers of human organs, for example as it happens in the detachment of the neurosensory retina from the underlying retinal pigment epithelium that causes retinal detachment potentially leading to blindness. Further applications can be foreseen in the field of soft robotics for the next generation of mechanosensitive end-effectors, particularly for the development and design of grippers, manipulators and adhesive pads. The present PhD research proposal aims at developing experimental protocols for the design and fabrication of biomimetic interfaces “on demand” for optimized (bio-)adhesion. The research will benefit of the technologies available at the [TriboDynamics Lab](#) (DMMM, PoliBa), such as the state of the art two-photon polymerization (2PP) microfabrication system which allows to fabricate 3D components and interfaces with spatial resolution down to 200 nm. The proposed research will be carried on in collaboration with the Department of Bioscience and Biotechnology of the University of Bari (DBB, UniBa), which will support the project providing in-depth knowledge of the physiology of the tissues and cells to be considered. A minimum period of 6 months of research will be carried abroad thanks to many active collaborations with CNRS (Lyon, France), with TUHH Hamburg, TU-Berlin.

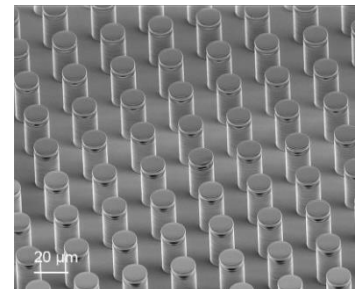


Figure 2 – Micro-structured surface for interface functionalization @Nanoscribe



Figure 1 - TriboDynamics Lab at DMMM, PoliBa

For further information please send us an email antonio.papangelo@poliba.it.