



SIMPPER_MedDev - Surface Integrity for Micro/Nano Processing of Polymers: A European Research Training Network for High-Performance Medical Devices

Increased demand for high-quality healthcare for our aging population means that medical device design must satisfy multiple requirements for enhanced biocompatibility, anti-bacterial resistance, manipulation of proteins and improved physical properties. The use of micro/nano structures integral to the surface of a device is a novel way to uniformly tune and control these properties. Polymer materials are ubiquitous in medical devices: in Europe alone, this sector includes 27,000 companies employing 675,000 people with an annual turnover of €110 billion. Precision processing of polymers with micro/nano structures is critical to developing high value-added medical devices. Our ETN focuses on surface integrity issues when micro/nano processing polymers for high performance medical devices. We will develop micro/nano-scale precision manufacturing processes, specifically moulding and forming, and additive and subtractive manufacturing, aimed at 6 classes of medical devices that have particular industry-defined requirements. A strategy to design surface micro/nano structures that provide required functionality for these devices will be established. The surface integrity of these materials and devices will be studied at a fundamental level and correlated with functionality, allowing for optimising the efficacy and performance of the medical devices. Our training will ensure that 12 outstanding ESRs become experts in design and the precision micro/nano processing of polymers for medical devices, thereby improving their career prospects. Our ESRs will undertake interdisciplinary and intersectoral research on polymer micro/nano processing for medical applications and obtain work experience with international industry. They will receive specialised technical training and transferable skills structured around state-of-the-art individual research projects that will provide them with pathways to engineering and manufacturing careers in Europe's world-leading industry.

UNIPD Team Leader: Giovanni Lucchetta

Department: Department of Industrial Engineering

Coordinator: University College Dublin (Ireland)

Other participants:

Danmarks Tekniske Universitet (Denmark)

Universiteit Twente (Netherlands)

Università degli Studi di Padova (Italy)

Fachhochschule Nordwestschweiz (Switzerland)

Becton Dickinson Research Centre Ireland Ltd (Ireland)

Novo Nordisk A/S (Denmark)

Micronit Microtechnologies B.V. (Netherlands)

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