SOFT AND NON-FOULING POLYZWITTERIONIC COATINGS FOR NEURAL INTERFACES

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Neural interfaces serve as a communication platform between artificial devices and the patient's nervous system, enabling a functionality improvement of prosthetic limbs and a higher quality of life of amputees and patients affected by spinal cord injuries [1]. Nowadays, polyimide (PI) is often considered as the elective material for advanced neural interfaces [2]. However, to ensure a long-term stability and functionality of neural electrodes, both chemical and mechanical features of the implanted material should be taken into account. Aiming at decreasing the mechanical mismatch between neural tissue and implanted PI electrode and targeting a non-fouling behavior, we developed a photocrosslinked coating on PI, based on a poly(carboxybetaine) hydrogel.

Copolymers were prepared by the free-radical polymerization of zwitterionic monomers 2-{dimethyl[3-(2-methylprop-2-enamido)propyl]ammonio}acetate and monomers bearing a photoreactive azidophenyl units, N-(4-azidophenyl)-2-methylprop-2-enamide. The cross-linking and attachment of the copolymer onto a PI surface was achieved by UV irradiation of a dry copolymer layer at 365 nm. The thickness of the hydrogel layer ranged from 3 to 6 μm in a dry state, as measured by white light interferometry. The elastic modulus was in the range 2 - 20 kPa, depending on the copolymer composition, the amounts of copolymer and the amount of surfactant (Pluronic F127). *In vitro* tests revealed a decreased adhesion of fibroblasts and macrophages onto polyzwitterionic hydrogels, when compared to pristine PI surfaces.

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