CHAMELEON INSPIRED RESPONSIVE STRUCTURES FOR MONITORING WOUND HEALING

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Monitoring wound healing remains a clinical problem. In this project, a wound healing-promoting hydrogel capable of monitoring the development of the wound is fabricated with the aim that the material yields a clear signal detectable by the naked eye. Inspired by the nanostructures found in chameleon skin [1], we combine molecularly imprinted polymers (MIPs) to detect collagen as a marker of the wound healing process, with ordered crystalline arrangements to reflect a visual signal. For that, silica nanoparticles (SiNPs) are functionalized with an epitope of collagen (as template) via click chemistry. These SiNPs are arranged in regular repeating networks, in order to reflect a specific wavelength. Then, a polymer solution based on N-isopropyl acrylamide (NIPAAm) and acrylic acid (AAc) acting as functional monomers are polymerized in the surroundings of the arranged SiNPs. After the redox polymerization is completed, the silica is removed by fully etching the SiNPs and the peptide using hydrofluoric acid, leaving behind a cavity that is specific for the recognition of collagen. Therefore, when this molecule comes in contact with the binding site, it changes the size of the cavity and thus the reflected wavelength. The desired material is a promising sensing method that is convenient for the detection of biomolecules in general, since the binding of collagen is detected by an easy readable naked-eye signal.

[1] Teyssier, J., Saenko, S. V., van der Marel, D. and Milinkovitch, M. C. Photonic crystals cause active colour change in chameleons. *Nature communications*, **2015**, 6, 6368.