Towards pH Sensing in Hybrid Silk Materials for Wound Healing Applications

L. Hung[a], A.N. Abraham[a,b], Z. Kopecki[c], H. Haidari[c], E.J.G. Ellul[a], A.J. Cowin[c], R.A. McLaughlin[d], C. Bursill[e], A. Khalid[a,b], B.C. Gibson[a,b]

[a] *School of Science, RMIT University, Melbourne, VIC 3000, Australia*

[b] *ARC Centre of Excellence for Nanoscale Biophotonics, RMIT University, Melbourne, Victoria 3000, Australia*

[c] *Future Industries Institute, University of South Australia, Mawson Lakes, SA 5095, Australia*

[d] *Faculty of Health and Medical Sciences, The University of Adelaide, Adelaide, SA 5005, Australia*

[e] *South Australian Health and Medical Research Institute (SAHMRI), Adelaide, SA 5001, Australia*

Research into the wound healing process is vital for the purpose of accurately and effectively monitoring the health of wounds. Early detection of infection is key to shortening the healing time, and resources required for wound care, whilst reducing long-term complications. Assessment of wound regeneration not only requires removal of such dressing, which is painful, time-consuming, and increases the likeliness of infection but also requires the expertise to identify potential infections. Research has shown that variations in pH can be used as an indication of infection or for determining the progress of wound healing [1]. Whilst healthy skin is acidic, the pH of open wounds are more alkaline with chronic wounds reported to have a pH as high as 8 [2].

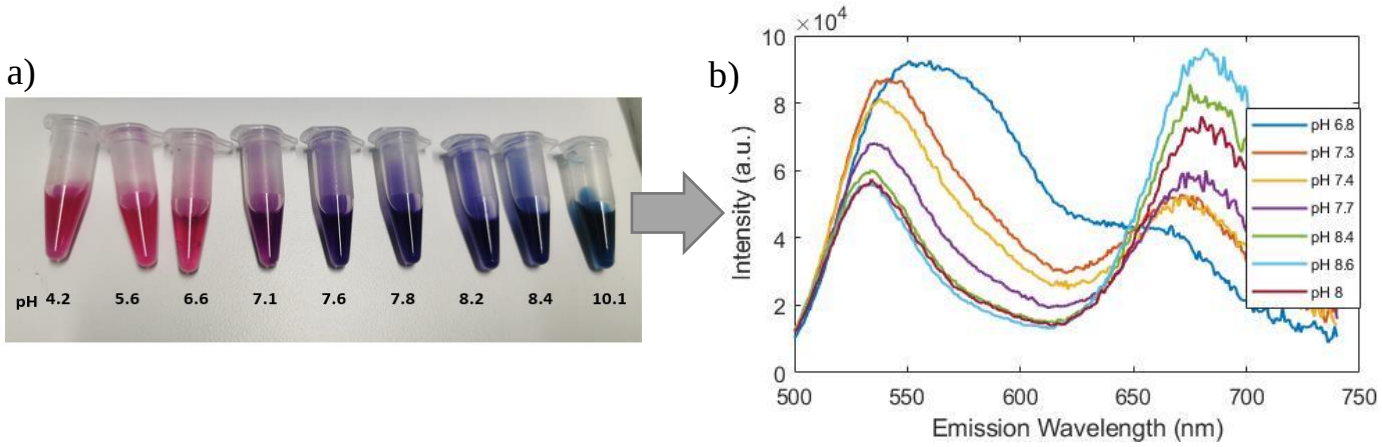

Figure 1: a) Fluorescent pH sensor 5(6)-Carboxynaphthofluorescein (CNF) showing observable pH change, b) Emission spectra of CNF in-solution at varying pH levels

Research into creating a hybrid smart material with the capabilities of detecting changes in pH levels, through fluorescence spectroscopy, may aid in the external monitorisation of wound health. I will present experimental data involving the encapsulation of a ratio-metric pH sensor (Figure 1) within silk for smart wound dressing applications. The performance of the smart dressing is tested and evaluated in a range of relevant biological conditions including temperature, pH variations, and incubation fluid composition.

1. L. A. Schneider, A. Korber, S. Grabbe and J. Dissemond, Arch Dermatol Res **298** (9), 413-420 (2007).
2. G. Yosipovitch, G. L. Xiong, E. Haus, L. Sackett-Lundeen, I. Ashkenazi and H. I. Maibach, J Invest Dermatol **110** (1), 20-23 (1998).

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