Characterization of extruded Collagen Fibres with Imaging Ellipsometry

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Manufacturing biocompatible surfaces has evolved into a cornerstone for downstream biomedical and pharmaceutical applications. In live tissues the structural and biochemical support for cells is maintained by various secreted extracellular matrix (ECM) components. The *ex vivo* deposition and network formation of these components on various scaffolds is crucial for subsequent cellular adhesion processes, thus vital for the production of tissue-like implants or effective cell-seeding on prostheses.

Here we focus on collagen, a highly abundant protein and key component of the ECM. The purified protein was extruded through a nanoporous filter, like dough in a pasta machine, and deposited as a drop onto a conventional glass microscope slide [1]. The sample was a kind gift from the Emmy Noether research group for nanoBiomaterials of Prof. Dorothea Brüggemann. We used imaging ellipsometry for the analysis of the extruded collagen fibres. A total sample overview covering 2.7 cm^2 was generated by the integrated image stitching algorithm combining 1008 single contrast micrographs into one image (Fig. 1 A). Back reflections of the glass slide are suppressed using the unique knife-edge illumination (B). Regions of interest were selected upon this pre-screening and Δ/Ψ maps were recorded spectroscopically from 400 to 760 nm (C). After applying an ellipsometric model, we analyzed the thickness and optical properties of the collagen network.

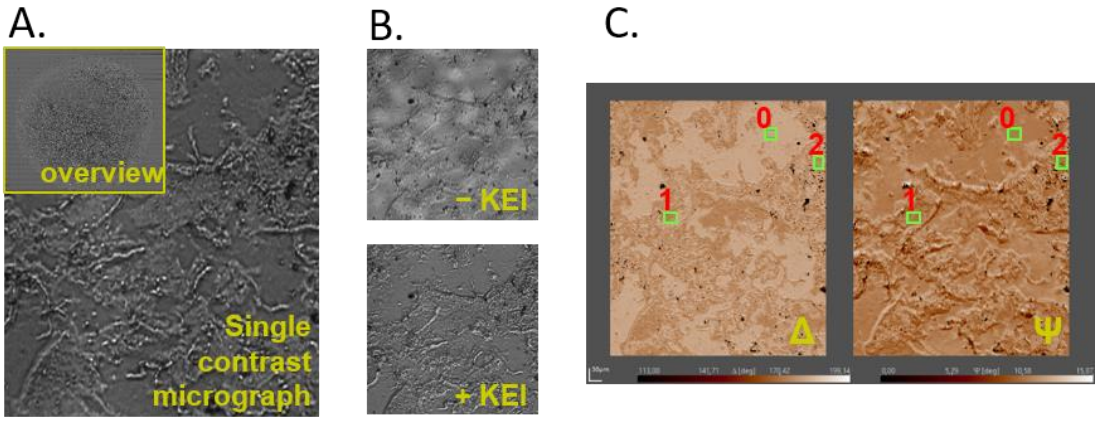

Fig. 1. Ellipsometric characterization of extruded collagen fibres. A) Total sample overview realized by stitching of contrast micrographs. B) Back reflection suppression by knife-edge illumination. C) Exemplary Δ/Ψ maps of the collagen network at 400nm with depicted ROIs (Regions of interest).

Keywords: Imaging Ellipsometry; Collagen; Biocompatible Surfaces; Transparent Substrates

References

[1] Raoufi, M. et al., Integr Biol (Camb) 8 (2016) 1059–1066.