

Input of FTIR microscopy to investigate Poly L-Lactic acid degradation mechanism



Subject: Implanted PLLA degradation study with a new approach combining FTIR spectroscopy and imaging.

Technique: FTIR Microscopy

✓ATR Imaging : mapping of chemical functions

Résultats :

➔ Degradation results in a peak shift and intensities of at $1\ 209\ \text{cm}^{-1}$ and $1\ 130\ \text{cm}^{-1}$ change in relation to cristallinity change.

➔ Cristallinity increases when PLLA molecular weight decreases. This is the result of degradation by hydrolysis phenomenon.

➔ R1 ratio (intensity of $1\ 209\ \text{cm}^{-1}$ band / intensity of $1\ 181\ \text{cm}^{-1}$ band) shows a non preferential degradation of fibers.

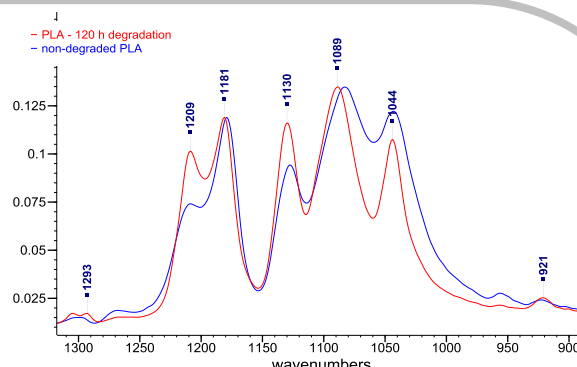


Fig. 1. FTIR Spectra of non degraded PLLA (blue) and degraded PLLA (red)

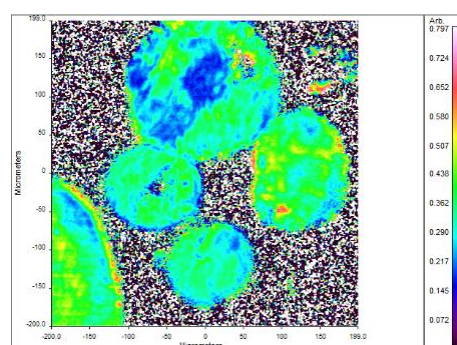


Fig. 2. FTIR Imaging of PLLA mesh after 26weeks of implantation. In red, degraded PLLA (high R1 ratio R1) and in blue, non degraded PLLA (low R1 ratio).

Conclusion : FTIR microscopy in ATR Imaging mode allows mapping of PLLA degradation on explanted tissues.