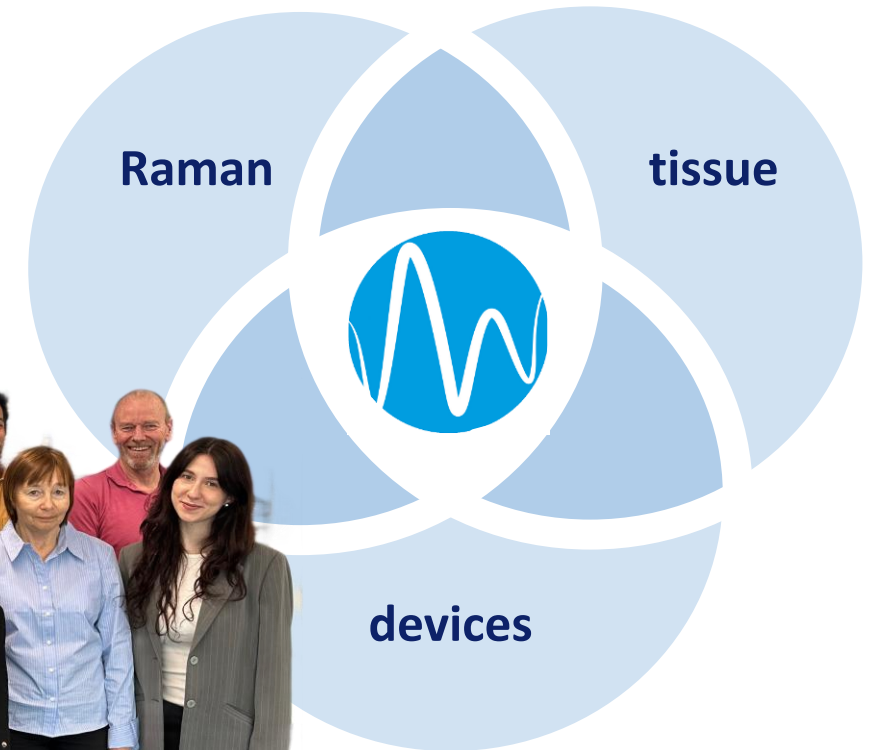


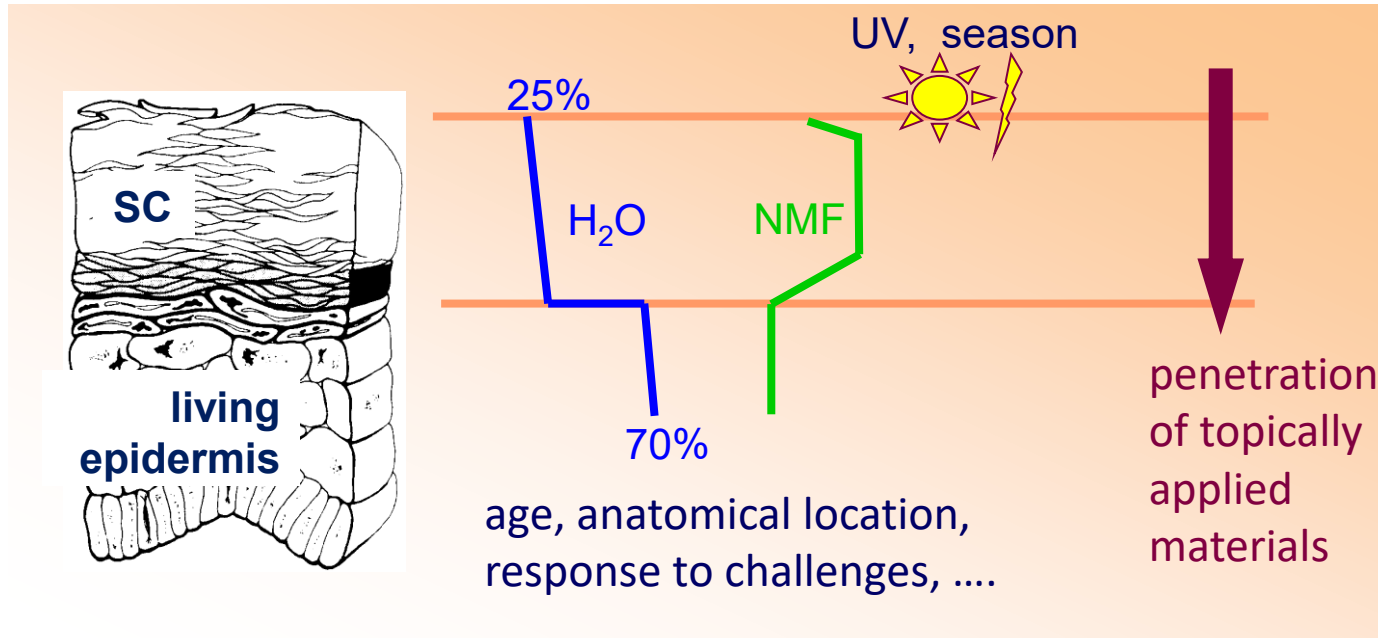
Fiber optics-based Raman spectroscopy for tissue analysis

RiverD International B.V.
Rotterdam, The Netherlands
gpuppels@riverd.com

- Based in Rotterdam, the Netherlands
- Head count: 17
- Spin-out of the Erasmus University Medical Center (2002)
- Close collaboration with the Dept. of Pathology of the University Hospital Antwerp, Belgium
- Implementing ISO 13485

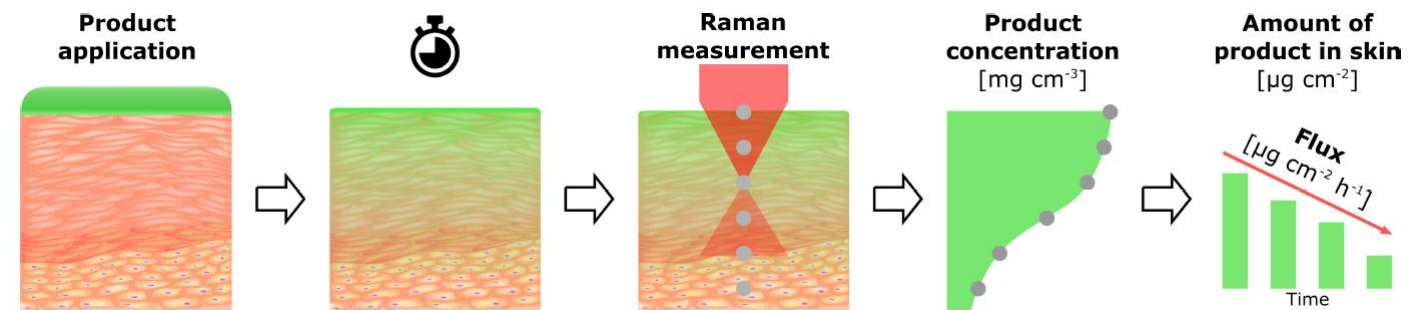


in vivo molecular skin analysis by Raman spectroscopy



Caspers *et al.* Translational Biophotonics (2019),
<https://doi.org/10.1002/tbio.201900004>

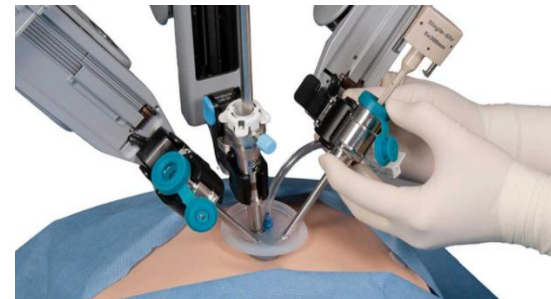
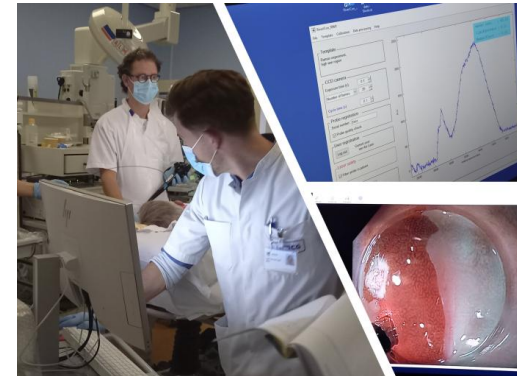
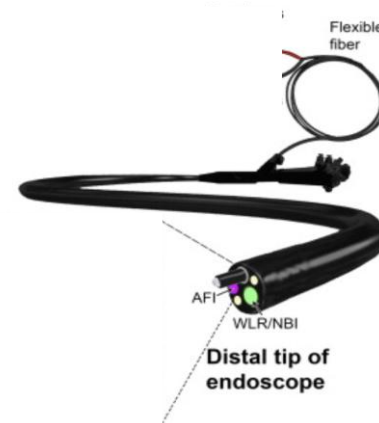
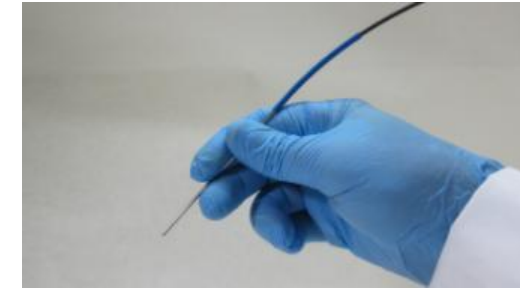
Nico *et al.* Pharmaceutics **2024**, 16, 304.
<https://doi.org/10.3390/pharmaceutics16030304>



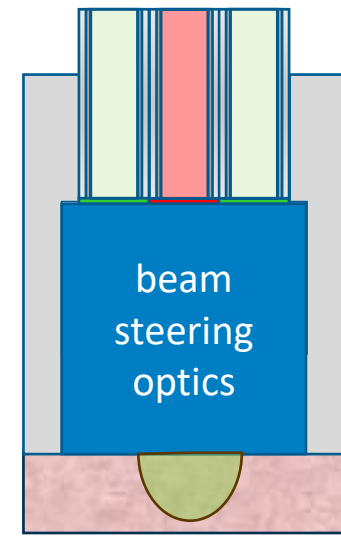
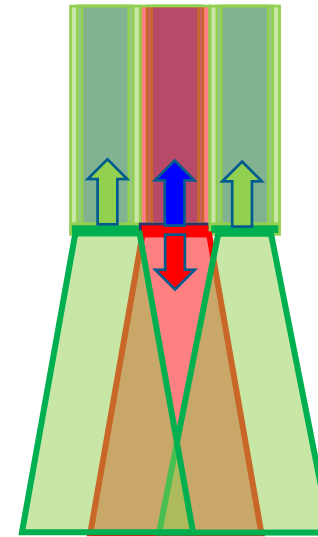
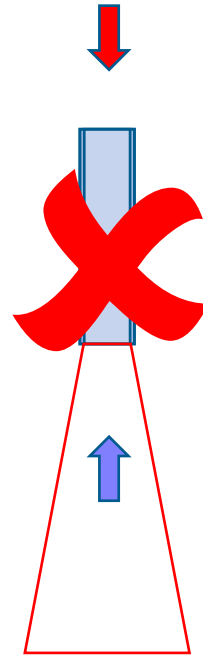
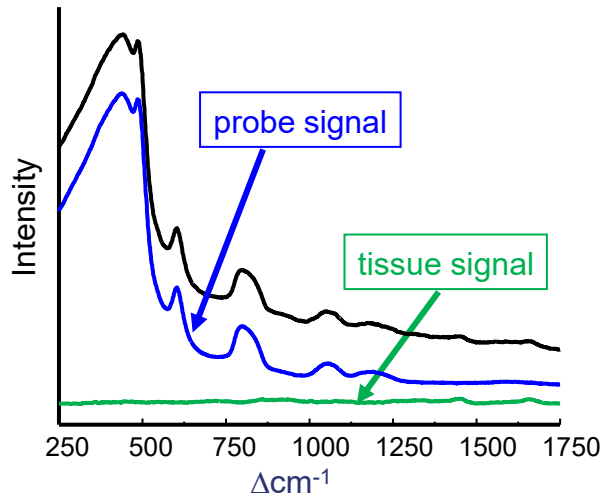
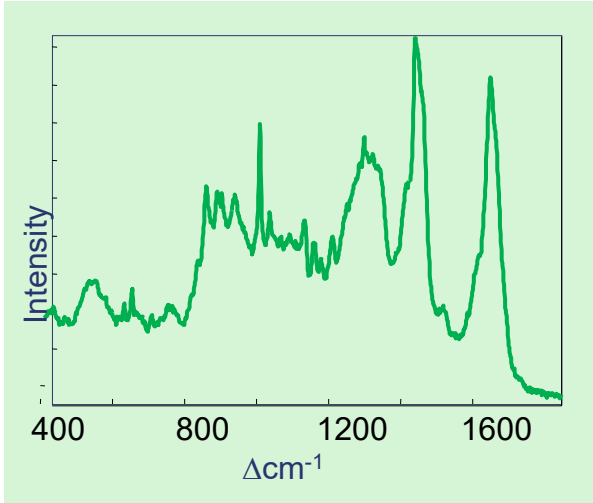
Under the skin → fiber optics

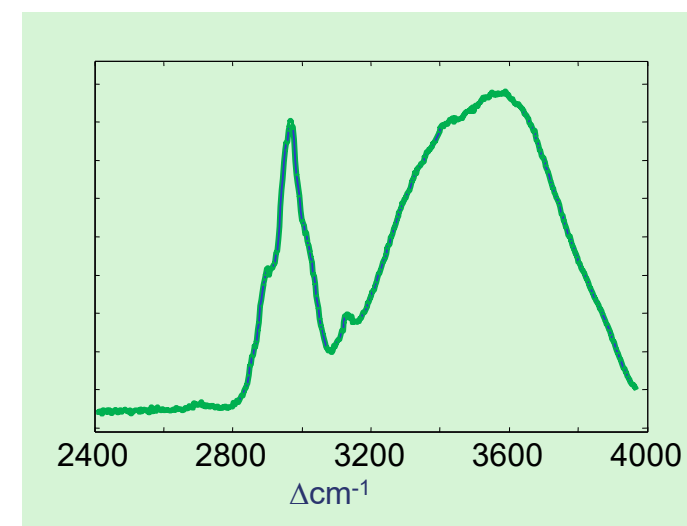
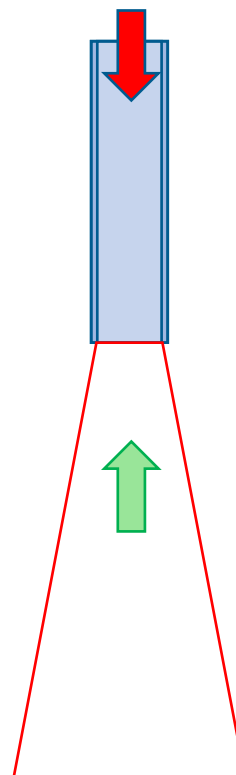
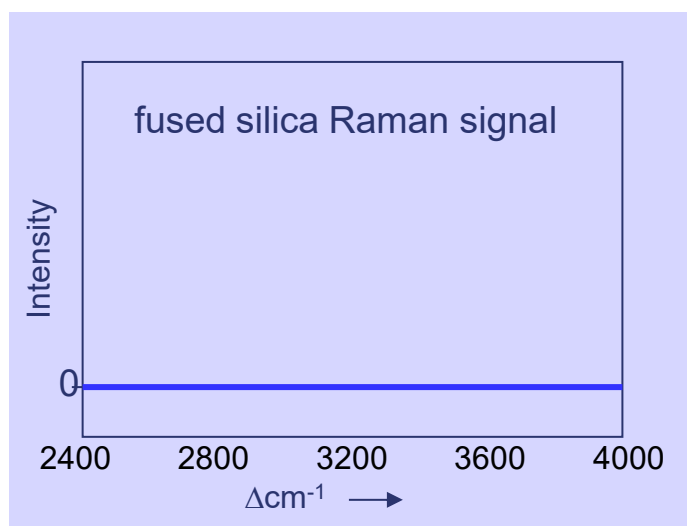
Fiber-optic Raman spectroscopic tissue analysis for

- guided biopsy (@endoscopy, FNA, ...)
- guided surgery (open, laparoscopic, robotic)



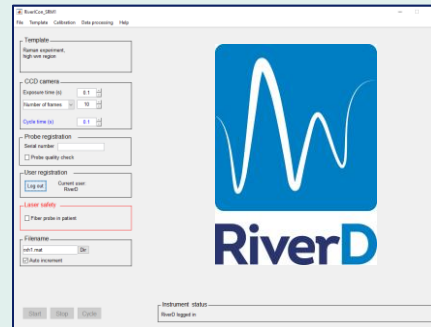
Fiber-optic Raman: a 30-year promise



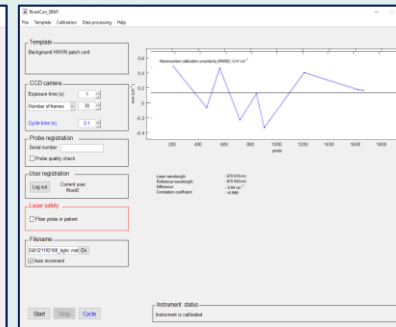


Wolthuis R *et al.*, *Anal. Chem.* 73(16), 3915–3920, 2001
Koljenović S *et al.*, *J Biomed Optics* 10(3), 031116, 2005
Santos L *et al.*, *Anal. Chem.* 77, 20, 6747–6752, 2005
Koljenović S *et al.*, *Anal. Chem.* 79(2), 557–564, 2007
Barroso *et al.*, *Cancer Res* 76(20), 5945–5953, 2016
Haskell J *et al.*, *Analyst* 148(18), 4373–4385, 2023

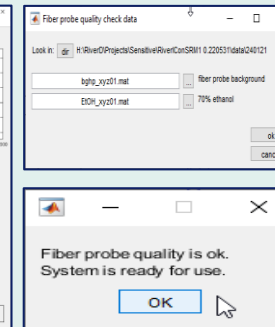
Technology for the end-user ... not a Raman-expert



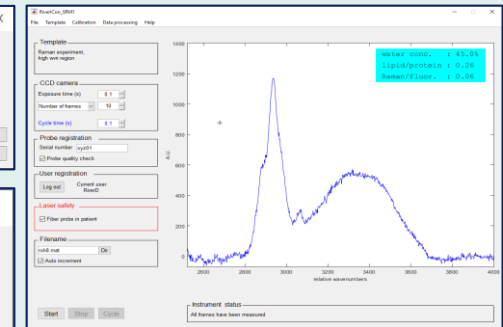
registration user & probe



auto-calibration



Q-check probe



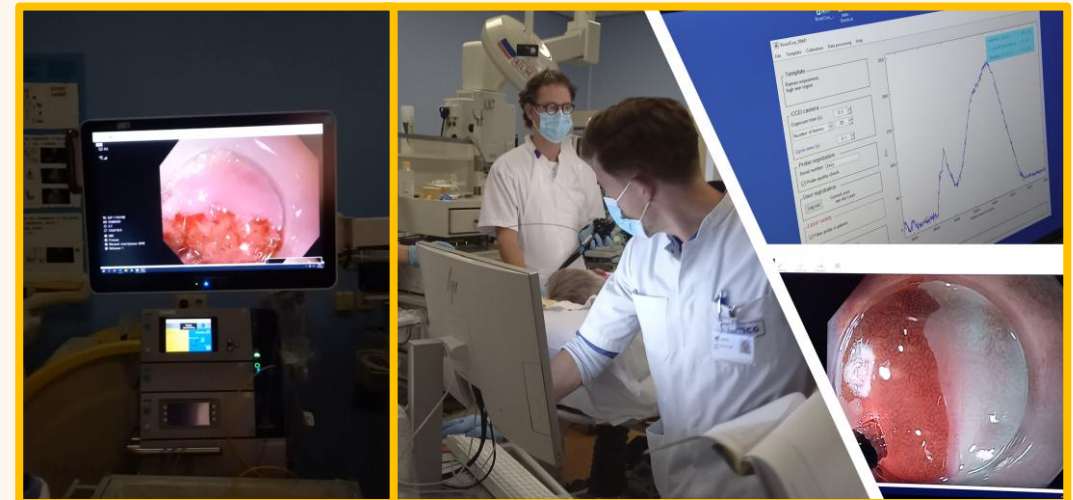
pre-processed spectra



SENSITIVE



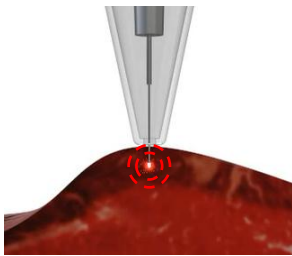
University Medical Center
Groningen, NL



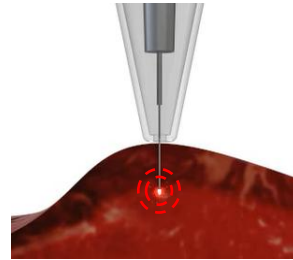
Raman-guided tumor surgery



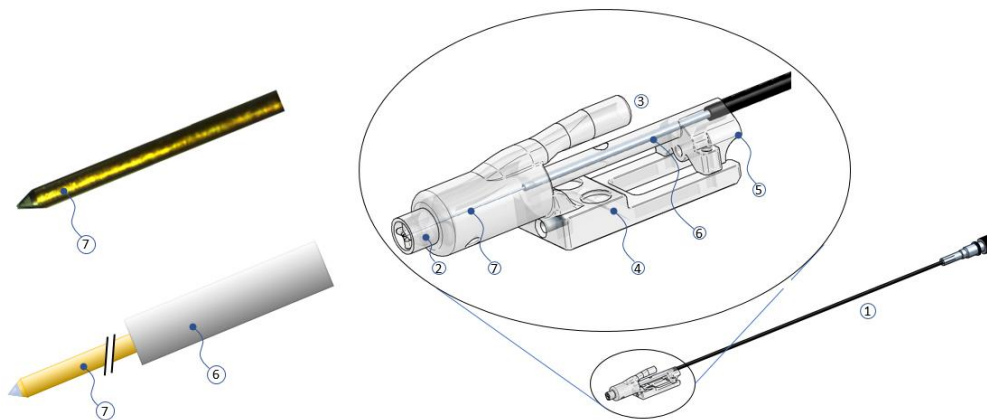
measurement



healthy tissue



tumor



Aaboubout, *et al.*, Analyst, 2023, 148, 4116–4126

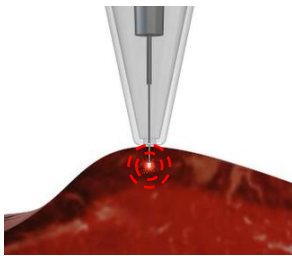
DOI: 10.1039/d3an00650f

Patented & patents pending

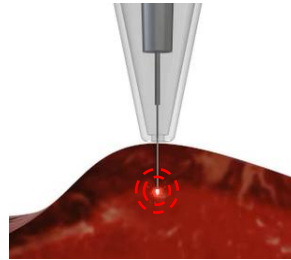




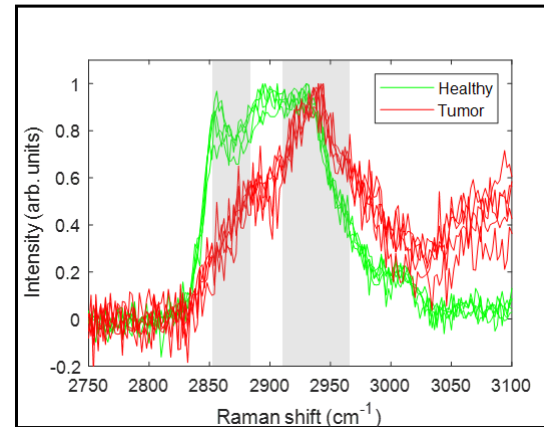
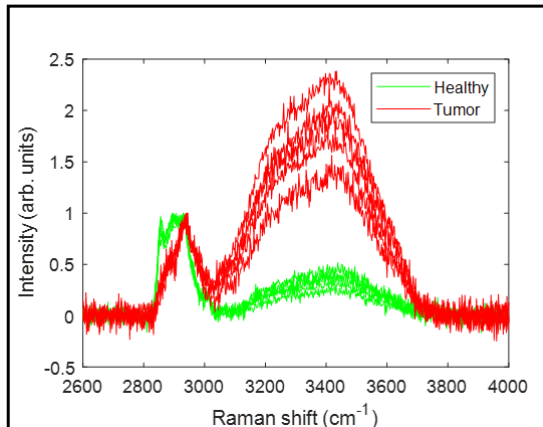
measurement



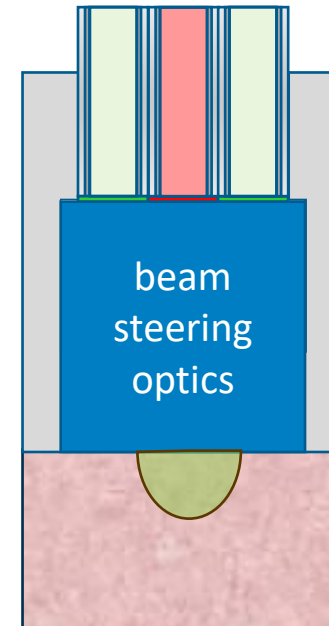
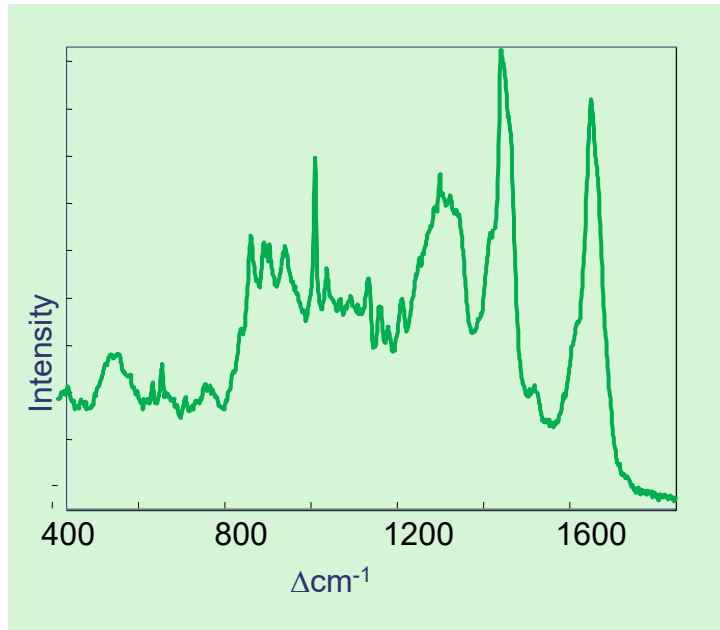
healthy tissue



tumor

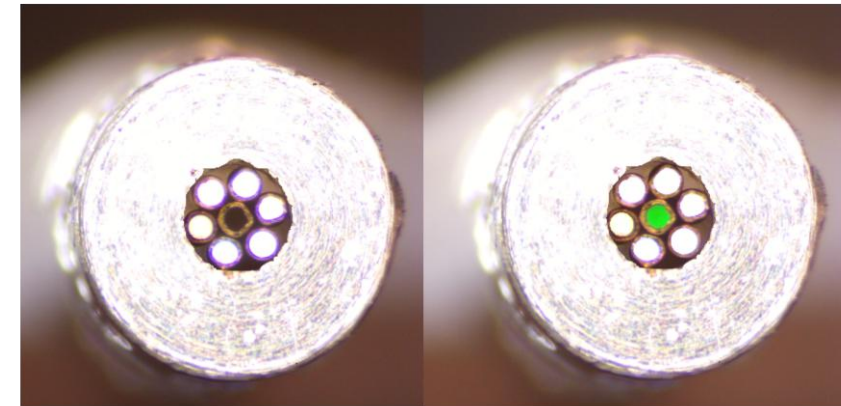
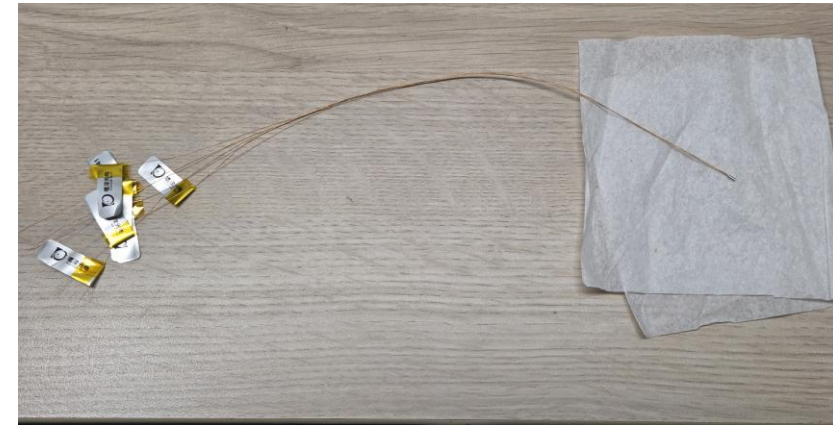
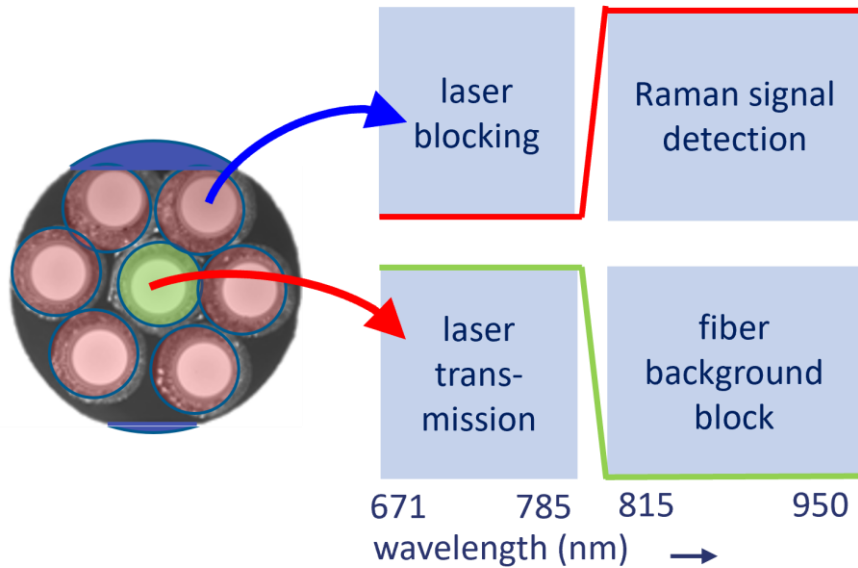
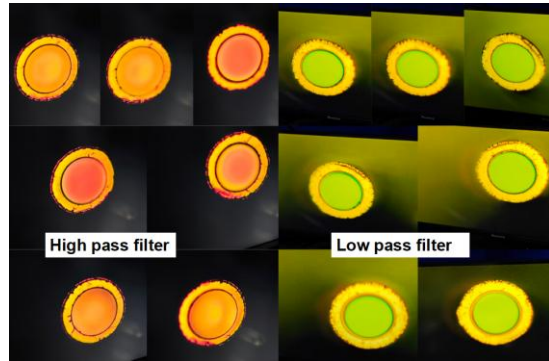


Fingerprint fiber-optic Raman: have not given up ☺

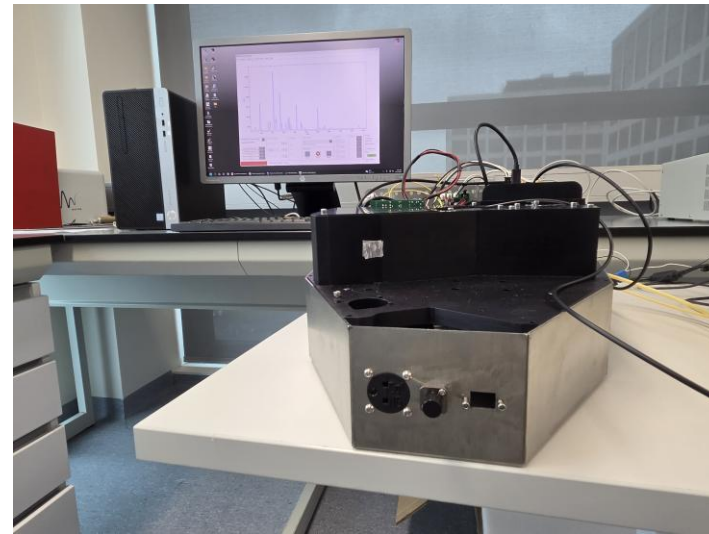
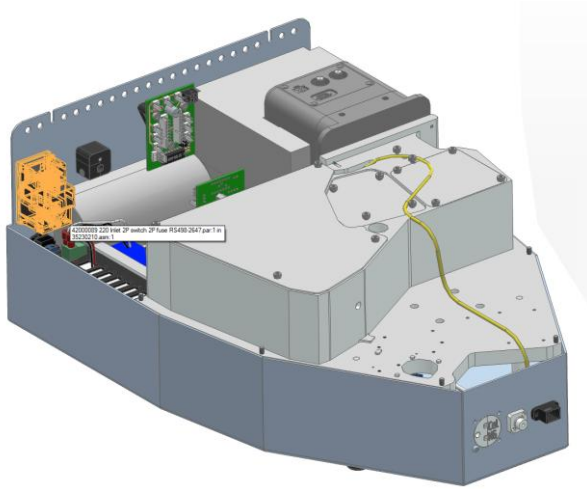


- simple
- affordable
- available (mass producible)
- reproducible
- small, flexible

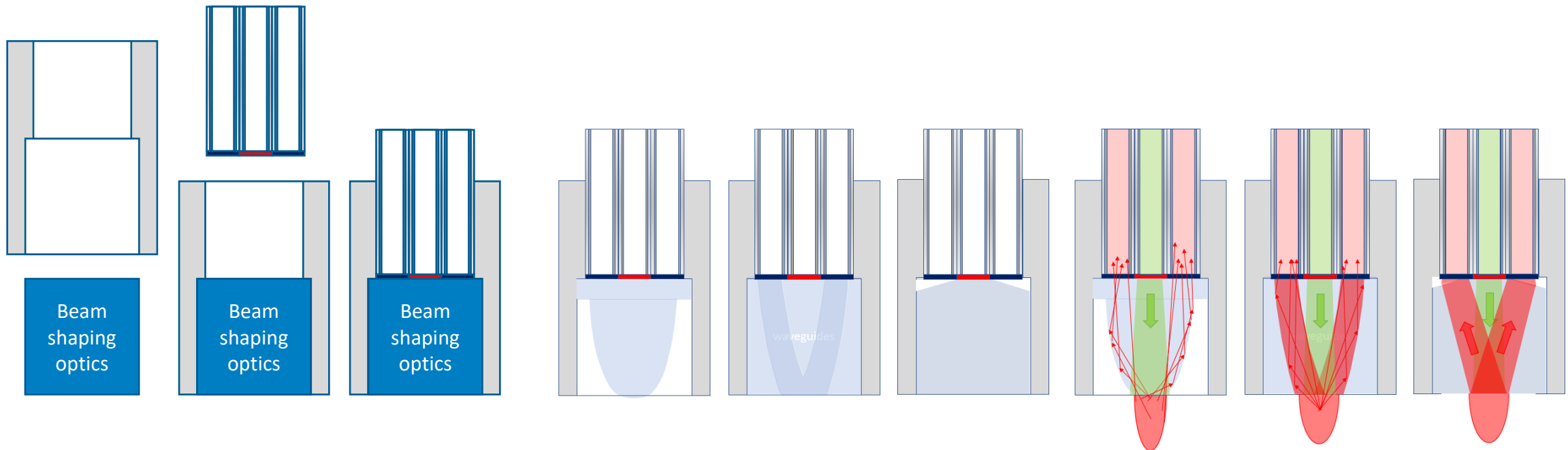
Fibers with filters



Dedicated fiber-optic Raman spectrometer



What is left beam steering at the tip



Open to any ideas and suggestions

What can we do for you?

- fiber-optic Raman technology platform for ex vivo / in vivo tissue analysis
 - ready to provide/partner/collaborate in applications development
 - guided surgery (robotic, minimally invasive, laparoscopic, open, ...)
 - guided biopsy (@endoscopy, ...

What can you do for us?

- word of mouth, referrals (surgery, biopsy, ...)
- technology for beam steering at the probe tip (affordable, producible, reproducible)
 - probe production