Electronic Supplementary Material (ESI) for Analyst.

Point and Shoot – The Benefit of Resonant Raman Reporters for Probing Through Plastic and Tissue Barriers Using Handheld Surface Enhanced Raman Spectroscopy (SERS)

Experimental

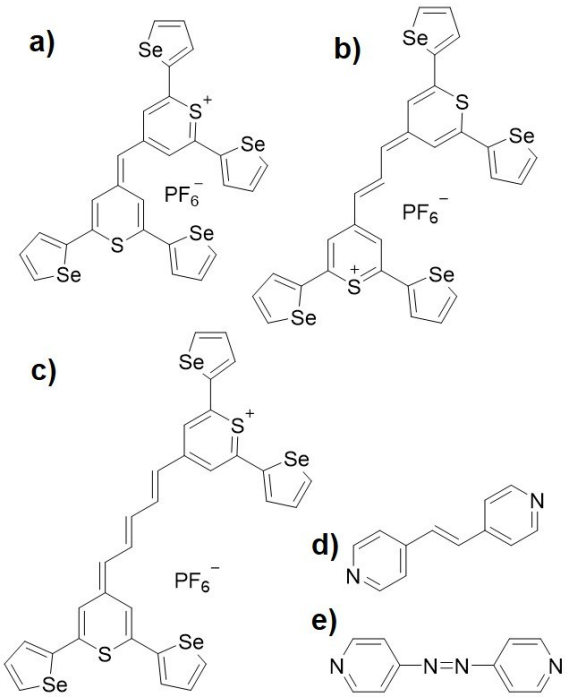

Figure S1 – Chemical structure of dye 676 (a), dye 823 (b), dye 959 (c), BPE (d) and AZPY (e)

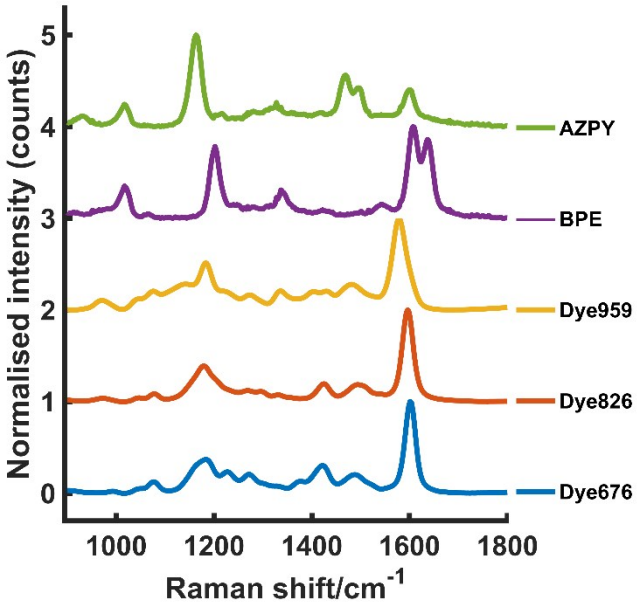

Figure S2 – SERS spectra of dye 676, dye 823, dye 959, BPE and AZPY. Reference SERS measurements of the unobscured nanotags were preformed using a handheld CBEx instrument from Snowy Range Instruments, 785 nm wavelength, 1 s acquisition.

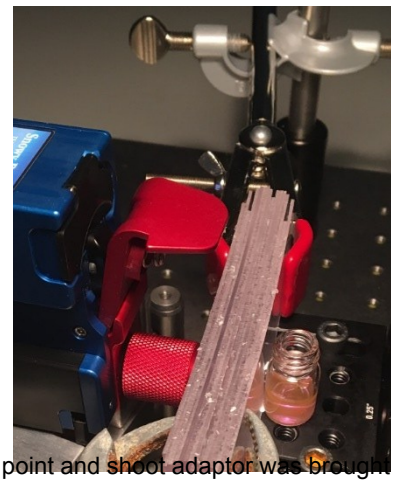

Figure S3 – Experimental set up. The point and shoot adaptor was brought into contact with the plastic barrier and the nanotags placed behind the plastic in a vial.

Figure S4 – Experimental set up involving the tracking of nanotags through tissue. The nanotags were held in a microcuvette and obscured by the tissue. The point and shoot adaptor was used to bring the tissue into contact with the instrument, thus ensuring there was no space between the tissue and the instrument.

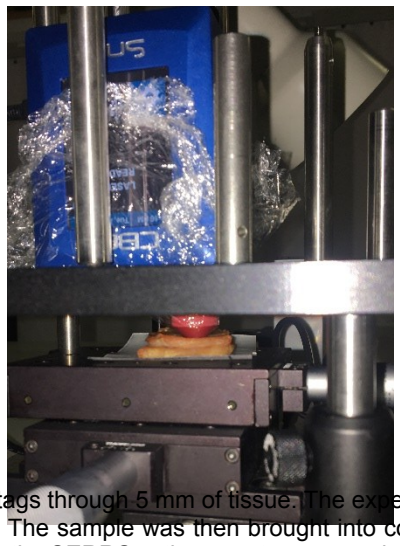

Figure S5 – Mapping of SERRS nanotags through 5 mm of tissue. The experimental set-up involved mounting the instrument above the tissue samples. The sample was then brought into contact with the laser via the point and shoot adaptor. MTS models containing the SERRS active nanotags were also placed onto a section of tissue. They were then obscured by a sample of tissue with a thickness of 5 mm. Using an x-y translational stage, the SERRS nanotags were mapped through 5 mm of tissue (10 × 10 grid, step size 1 mm).

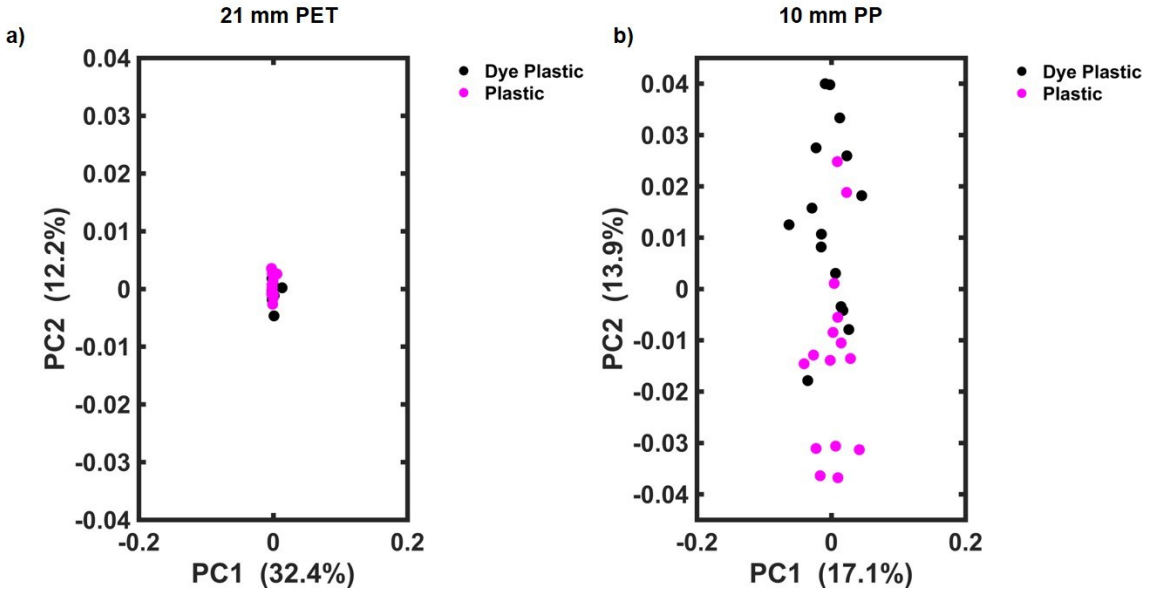

Figure S6 – PCA scores plots of the tracking of dye823 through 21 mm of clear PET and 10 mm of blue PP using a handheld conventional Raman instrument. In both instances, the pink clusters refer to plastic reference spectra at a given thickness (e.g. 21 mm), and the black cluster refers to a solution of dye 823 nanotags obscured by the same thickness of plastic (e.g. 21 mm). In both instances (PET and PP), no separation is seen in the scores plots across both PC1 and PC2 which have the maximum variance. Thus, the instrument is no longer capable of detecting a solution of dye 823 nanotags at thicknesses of 21 mm of PET and greater as well as thicknesses equal to and greater than 10 mm of blue PP.