ELECTRONIC SUPPLEMENTARY INFORMATION

Figure S1: Representative examples of the foot print of the focussed and de-focussed single synchrotron IR beam, as recorded on the 32 × 32 active pixels of the FPA imaging detector.

Figure S2: Representative examples of using false-colour FTIR images based on integrated areas under the carbonyl stretching band of esters in lipids (ν(C=O): 1755 – 1715 cm^{-1}) to reveal the location of cell bodies in healthy (sham) brain tissue. Note that neurons have relatively lower lipid contents than those of the surrounding neuropil tissue. Min-Max scale ranges from 0 to 0.2 in each image. Scale bars = 10 μm.

Figure S3: SR-ATR-FTIR maps of protein and lipid distribution acquired from triplicates of individual bacterial cells at 1 μm pixel size, to reveal the location of lipophilic inclusions within bacterial cells. Scale bar = 2 μm.

Figure S4: Comparison of the amide I protein images of the same brain cell imaged with single-beam SR-ATR-FTIR-FPA imaging, and SR-ATR-FTIR mapping. (**A**) Bright field optical image of a degenerating cell in ischemic brain tissue. (**B**) False colour functional group image of total protein (amide I band), showing location of degenerating neuron, recorded with single-beam SR-ATR-FTIR-FPA imaging. (**C**) False colour functional group image of total protein (amide I band), showing location of degenerating neuron, recorded with SR- ATR-FTIR mapping. Scale bar = 5 μm.