Multimodal & Non-Linear Microscopy

An illustration of multimodal fluorescence and non-linear microscopy, Part 2

Targeted cellular and label-free imaging with the simultaneous use of Auto Fluorescence, Two-Photon Fluorescence Excitation (2PFE), Second-Harmonic Generation (SHG), and Coherent anti-Stokes Raman Scattering (CARS).

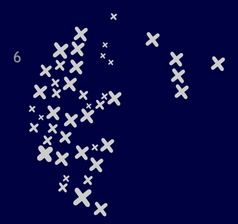
1 Keyword
2 Sample
3 Label Free ● / Label
4 Imaging Method
5 Laser Excitation Type
6 Image
7 Energy Diagram

1 1PFE
2 Elastin
3 ●

4 Auto Fluorescence

5 fs-pulsed laser at 720 nm

6



2PFE
SMC Muscle Cells
Alexa 350

Two Photon Fluorescence Excitation

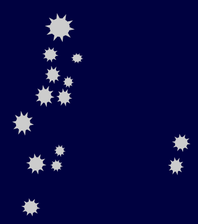
fs-pulsed laser at 720 nm

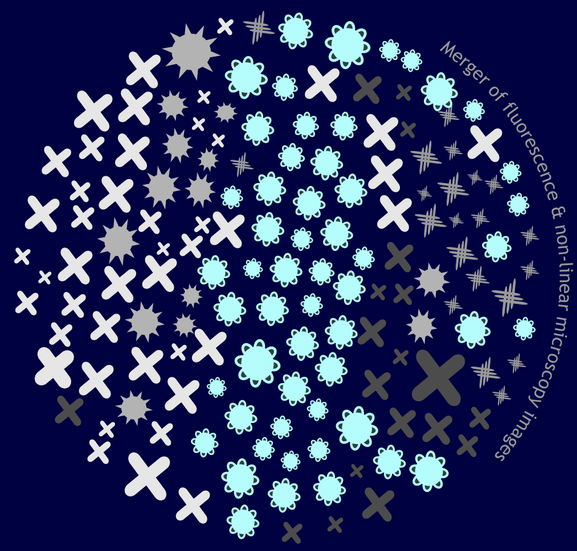


SHG
Collagen
●

Second Harmonic Generation

ps-pulsed laser at 817 nm





Illustrated sample: Atherosclerotic aorta from apolipoprotein E-deficient mice.

2PFE
Macrophages
Alexa 594

Two Photon Fluorescence Excitation

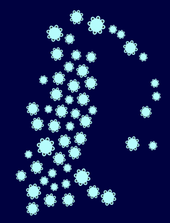
fs-pulsed laser at 720 nm, 800 nm also suitable



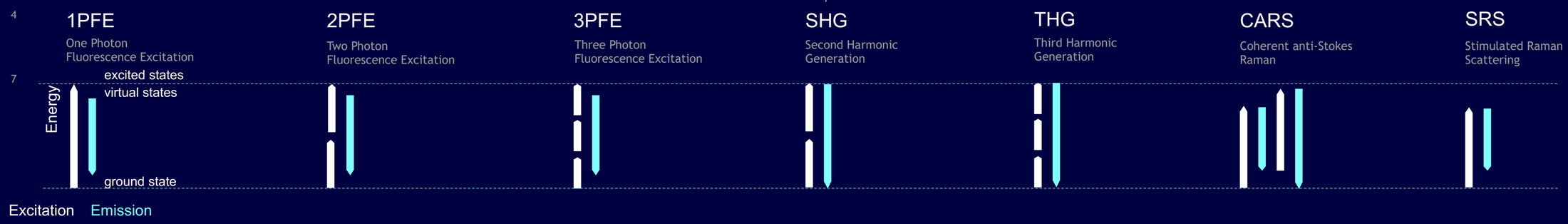
CARS
Lipids
●

Coherent anti-Stokes Raman

ps-pulsed laser at 817 nm and 1064 nm



Jablonski Energy Diagram



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Illustration based on the results and with courtesy of Park, Joo Hyun & Lee, Sang-Wong et al. "Multimodal Nonlinear Optical Microscopy for Simultaneous 3-D Label-Free and Immunofluorescence Imaging of Biological Samples." Used laser systems: picosecond (ps) and femtosecond (fs) pulsed lasers.

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