



# picoEmerald - A Reference List

Imaging and Spectroscopy with a  
Tunable Two-Color-Source

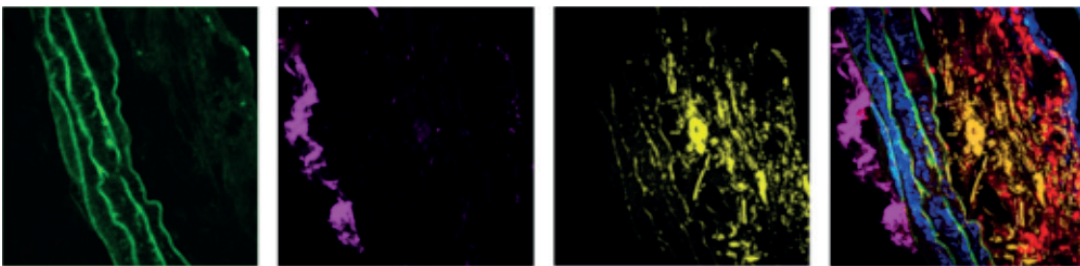


Image Courtesy: Sang-Won Lee & Joo Hyun Park.  
Multimodal nonlinear microscopic images incl. TPEF, SHG, CARS and merged image.



# APE's picoEmerald - A Reference List

## Introduction

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Raman-based microscopy and spectroscopy techniques allow samples to be investigated without labeling. The technique visualizes structures in samples by detecting the characteristic intrinsic vibrational contrast of their molecules. Thus, fluorescent dyes are not required.

APE's picoEmerald is an automated two-color laser source. It has been specifically designed to meet the requirements of CARS, SRS, multimodal imaging, SHG/multiphoton fluorescence, and similar methods.

picoEmerald enables the shortest pulses possible for the highest signal level while maintaining maximum spectral resolution in ps-coherent Raman measurements.

Combining picoEmerald with APE's SRS detection module allows very short integration times while maintaining high sensitivity, transforming picoEmerald into an automated source for stimulated Raman scattering (SRS) with up to video-rate speed.

## Typical Applications

- CARS - Coherent anti-Stokes Raman Spectroscopy
- SRS - Stimulated Raman Spectroscopy
- SHG - Second Harmonics Imaging
- SEHRS - Surface Enhanced Hyper Raman Spectroscopy

## Scientific References (Selection)

Topic	Journal	DOI	Author	Application	System
(2017). Imaging drug uptake by bioorthogonal stimulated Raman scattering microscopy.	Chemical Science	DOI: 10.1039/C7SC01837A	Tipping, W. J., Lee, M., Serrels, A., Brunton, V. G., & Hulme, A. N.	SRS	picoEmerald together with an Olympus FV1000 MPE
(2017). Elucidation of Compression-Induced Surface Crystallization in Amorphous Tablets Using Sum Frequency Generation (SFG) Microscopy.	Pharmaceutical Research	DOI: 10.1007/s11095-016-2046-6	Mah, P. T., Novakovic, D., Saarinen, J., Van Landeghem, S., Peltonen, L., Laaksonen, T., ... & Strachan, C. J.	SFG - Sum Frequency Generation	SP8 with picoEmerald by Leica
(2017). Anomalous Nonlinear Optical Response of Graphene Near Phonon Resonances.	Nano Letters	DOI: 10.1021/acs.nanolett.7b00329	Lafetá, L., Cadore, A. R., Mendes-de-Sa, T. G., Watanabe, K., Taniguchi, T., Campos, L. C., ... & Malard, L. M.	CARS	TCS SP5 II CARS with picoEmerald by Leica
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(2016). Multiphoton Microscopy for Visualizing Lipids in Tissue.  Methods in Molecular Biology DOI: 10.1007/978-1-4939-4023-3_9	Lee, M., & Serrels, A.		picoEmerald
(2016). Monitoring peripheral nerve degeneration in ALS by label-free stimulated Raman scattering imaging.  Nature Comm. DOI: 10.1038/ncomms13283	Tian, F., Yang, W., Mordés, D. A., Wang, J. Y., Salameh, J. S., Mok, J., ... & Suzuki, N.	SRS	picoEmerald together with an Olympus BX61WI / FV300 upright microscope
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Contact

Your local contact:

APE Angewandte Physik & Elektronik GmbH  
 Plauener Str. 163-165 | Haus N | 13053 Berlin | Germany  
 T: +49 30 986 011-30  
 F: +49 30 986 011-333  
 E: sales@ape-berlin.de  
 www.ape-berlin.de

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