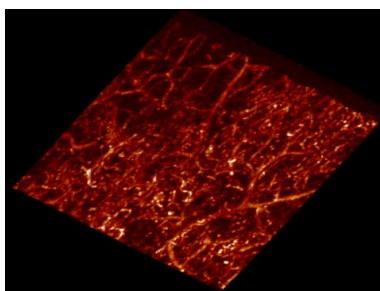


easyPAM – Photoacoustic Microscope

Imaging of functional and molecular features in deep tissue

The easyPAM system transforms your easySAM Acoustic Microscope into a state of the art photoacoustic imaging system for investigating deep tissues with high resolution. Photoacoustic imaging of optical absorbers, endogenous chromophores and exogenous stains improves the imaging depth without reducing image resolution due to optical scattering. Seamless integration with the easySAM microscope systems insures image quality, user friendliness and value for cost. Adding the easyPAM system consisting of the laser excitation module and the photoacoustic easyPAM lens to your easySAM Microscope gives you access to unique photoacoustic data while performing your standard microscopic investigations.



Applications

Photoacoustic imaging provides insights into the structure, physiology and function of complex tissue and 3D cellular models. The easyPAM system is ideally suited for a broad range of applications such as :

- tissue engineering and regenerative medicine
- investigation of living multi-cellular spheroids and 3D tissue models
- Investigation of cell microenvironment and stem cell niches
- vascularized grafts
- enervated grafts
- tumor necrosis models
- investigation of tissue grafts
- characterization of biopsies
- investigation of tissue sections

easyPAM Excitation Module

Designed as an add-on to the easySAM Acoustic Microscopes the easyPAM optical excitation module offers seamlessly integrated optimized photoacoustic excitation in the visible and near infrared. High power pulses with nanosecond duration and kHz repetition rates generate the optimal signal for achieving high contrast and high resolution at excellent imaging speed. As the easySAM itself, the easyPAM eliminates the complexity of photoacoustic imaging without compromising the performance. The easyPAM module is the optimal light source for investigating your Valuable samples in life science applications.

easyPAM Lenses

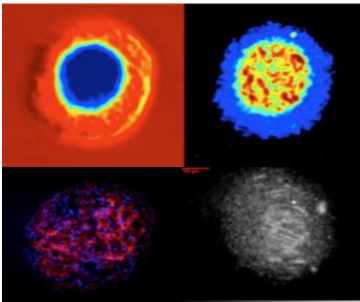
High sensitivity and exact focussing combined with an optimized multiwavelength illumination function are the characteristics of the easyPAM photoacoustic lenses. Based on its proprietary high frequency acoustic imaging transducer Technology kibero's engineers have developed this new line of transducers for optimal performance in 50MHz, 100MHz, 200MHz and 400MHz photo-Acoustic imaging, offering imaging resolution better than 5 μm with unbeaten sensitivity. The transducers are designed for compatibility with the easySAM microscopes series supporting the easy integration into most standard light Microscopy platforms.



easySAM – Acoustic Microscope

High resolution acoustic imaging meeting full flexibility of conventional microscopy

The easySAM series is a milestone in acoustic microscopy and is used to assess local mechanical properties of biological and cellular samples with micrometer resolution. The acoustic imaging technique does not induce damage and can be used to image the interior of opaque samples. Image quality, user friendliness and value for cost were the challenges for this new microscope line. With the easySAM systems consisting of an acoustic lens which fits to standard upright microscopes and easy to use software packages you can obtain unique ultrasound data while doing your standard microscopic investigations in parallel.



Applications

The combination of non invasive ultrasound and conventional microscopic imaging provides fast and easy quantitative ultrasound analysis and unique insights of deep tissue structures and 3D cellular models making the easySAM ideal for a broad range of applications such as:

- developmental biology
- tissue engineering
- investigation of living multi-cellular spheroids and 3D tissue models
- tumor necrosis models
- cell mechanics
- bone, bone implants, dentistry
- characterization of biopsies
- investigation of tissue sections
- ceramics and semiconductors
- composites
- material sciences

easySAM

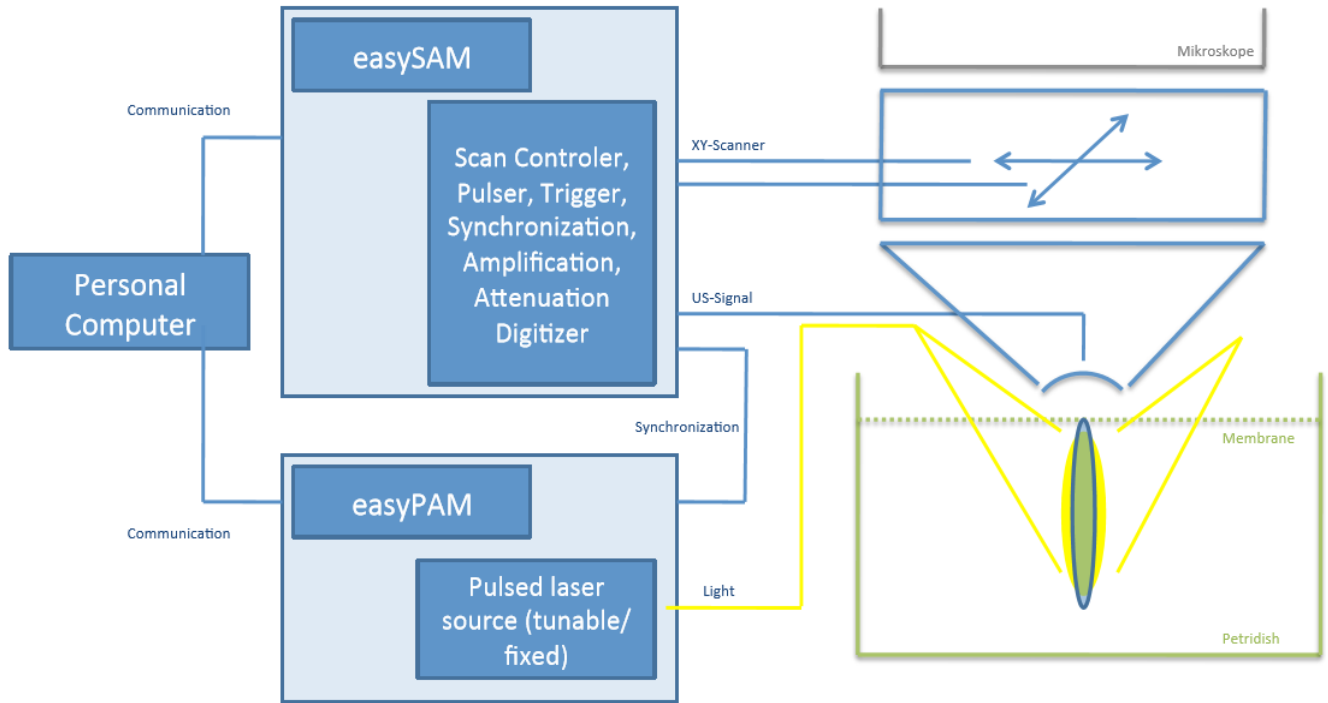
Designed to eliminate the complexity of high frequency ultrasound imaging without compromising the performance, the new easySAM series simplifies ultrasound imaging and make this powerful investigation tool accessible for life science applications. The versatile miniaturized ultrasound objective can be easily mounted via an adapter in the objective revolver of most standard upright microscopes. No specific and complicated ultrasound hardware setups are required and the systems offers flexibility of different microscope objectives and standard optical Microscope imaging modes such as phase contrast, bright Field or fluorescence imaging.

easySAM specifications

The easySAM microscope series offers highest imaging quality of even large scale samples in the frequency range of 50 MHz to 400 MHz. Fitting to the customer specific requirements and their applications three different models and software solutions are available, the easySAM basic, the easySAM research and the easySAM professional supporting a field of view of up to 10 mm and a signal resolution of 14 bit. The systems are easily integrated into standard microscopy platforms and support semi automatic image acquisition of the ultrasound data as convenient as with your well-known research microscope.



easySAM / easyPAM 시스템 개략도



Technical Data of easySAM models

Type	ES BAS E	ES RES 800 / 2000 E	ES PRO 2000 E
Center frequency [MHz]	100 / 200	100 / 200 / 400	100 / 200 / 400
Bandwidth [MHz]	50 – 250	50 – 400 / 100 – 400	50 – 450
Sampling rate [MHz]	800	800 / 2000	2000
Signal averaging [Fold]	1 – 4096	1 – 4096	1 – 4096
Pulse repetition frequency [kHz]	160	200	200
X.Y Scanner range [mm]	10 x 10	10 x 10	10 x 10
V(z) interface	no	yes	yes
Photoacoustic signal path	no	yes	yes
ES Lens SD 50 / 50 PA	yes / no	yes / yes	yes / yes
ES Lens SD 100 / 100 PA	yes / no	yes / yes	yes / yes
ES Lens SD 200 / 200 PA	yes / no	yes / yes	yes / yes
ES Lens SD 400 / 400 PA	no / no	yes / yes	yes / yes



easySAM / easyPAM

Technical Datasheet	
Multimodal Imaging	Combined acoustic and photoacoustic microscope
PAM resolution	Imaging resolution better than 5 μm with unbeaten sensitivity
Multiple wavelengths photoacoustic excitation	532 nm, 1064 nm, 710 nm – 890 nm
High sensitivity, variable amplification	40 – 80 dB variable gain, programmable
Real time averaging	1 – 1064 fold programmable
Imaging speed and scan resolution	Max. velocity 250 mm/s, max. 200 kHz PRF, Max. 0.1 μm resolution
Large field of view	10 mm x 10 mm
Scan Modes	Point, line, volume, A, B, C, v(z)
Data analysis and export	Single & multi-gate reconstruction and visualization of amplitude & time of flight Export of rf-data, 2D images, 3D volumes, v(z)
Add-on to optical microscopes	Combination with epi- and trans-illumination microscopy (darkfield, brightfield, phasecontrast) Combination with advanced light microscopy (fluorescence, confocal, TIRF, ...)
Small form factor	Table top system

Technical Data of Photoacoustic Excitation Module

Type	PAM 532 E	PAM 532 / 1064 E	PAM OPO E
Wavelength [nm]	532	532, 1064	350 - 2600
Pulse length [ns]	<2 ns	<2 ns	<10 ns
Pulse repetition rate [Hz]	1000	1000	4000
Light delivery system	fiber	fiber	fiber
ES Lens SD 50 PA	yes	yes	yes
ES Lens SD 100 PA	yes	yes	yes
ES Lens SD 200 PA	yes	yes	yes
ES Lens SD 400 PA	yes	yes	yes

