



4Deep instruments + software

holographic

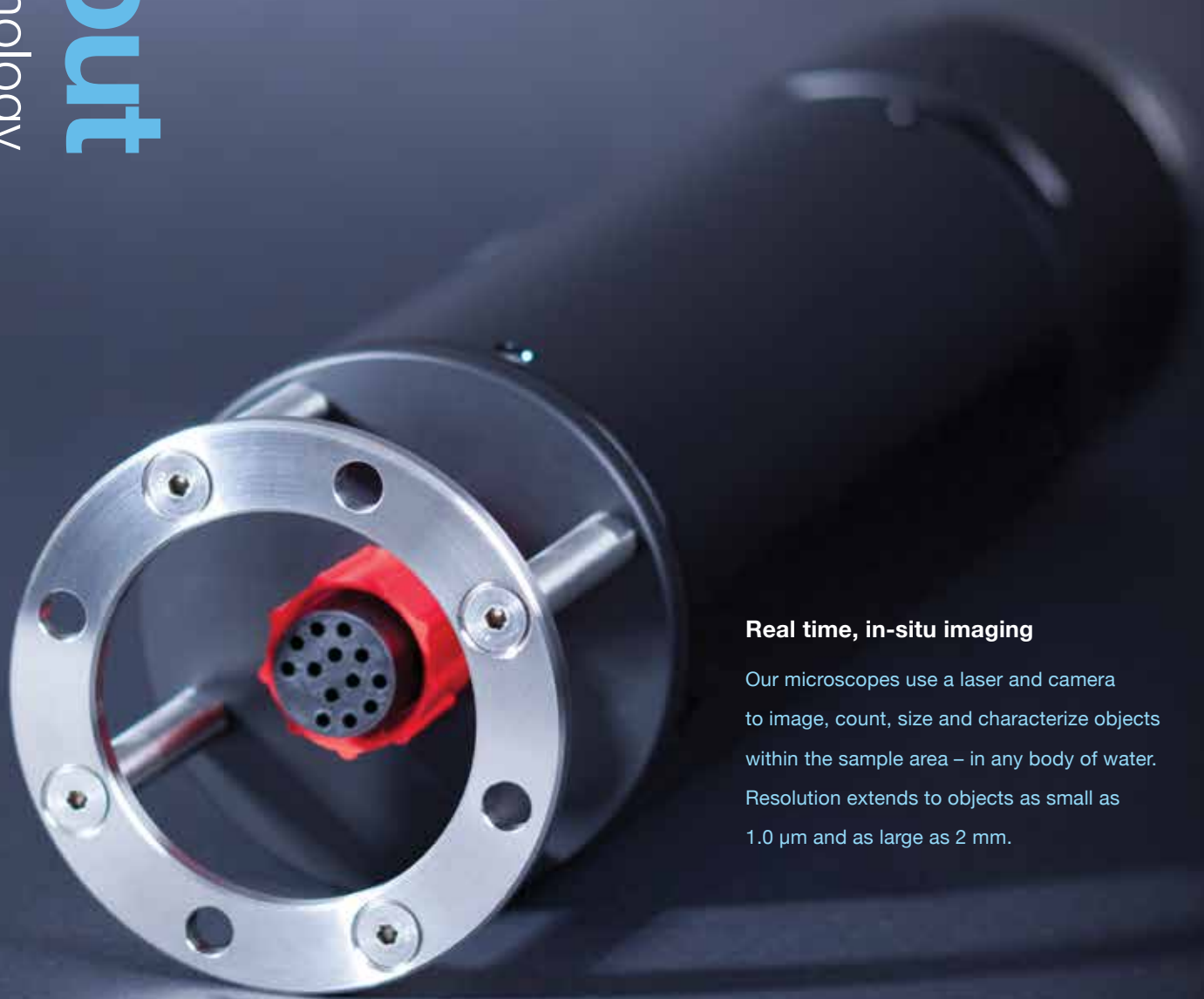
inwater
imaging



*live, in-situ monitoring of
particles & microorganisms
in all liquid environments*

About

our technology



Real time, in-situ imaging

Our microscopes use a laser and camera to image, count, size and characterize objects within the sample area – in any body of water. Resolution extends to objects as small as 1.0 μm and as large as 2 mm.

“These innovations will make imaging & analysis more powerful, flexible, productive & easier to accomplish.”

Microscopy Today



Applications

for deeper insights

Oceanography

Aquaculture

Algae Monitoring

Marine Shipping



Manufacturing

Research

Education

Biomedical

Municipal Water

Food + Beverage



Oil + Gas

Submersible

Microscope Systems

Live, in-situ
remote
monitoring
with superior
depth of
information



The submersible

The submersible microscope allows you to quickly and easily observe micro-organisms and particles.

User control

Remote commands of major operations using either a supplied Camera Remote Control utility or through 3rd party software.

Real-time

Real-time, in-situ observation of particles and micro-organisms in all aquatic environments.

Portable

Lightweight, easy to deploy, rugged.

High Flow Capabilities

Can be towed up to 4 knots and handle water speeds of 2 m/s due to a laser pulse duration as fast as 1 microsecond.

Fast Tracking

Up to 16 images per second to capture tracking dynamics of fast moving objects.

Save Time

Fastest hologram image reconstruction available at 65 ms. 1000 X faster than competitors.

Go Deeper

Functional from surface - 500 m. Up to 5000 meters in custom models.

0 - 500

2000

2000+

Autonomous Module

Power your
microscope &
remotely log
holograms



The Autonomous

Designed for longer deployments, or areas where connecting a cable from the Submersible Microscope to a computer will not do.

Programmed Control

The Module is programmable using user friendly software, setting the camera frame rate and timing for the duration of the deployment. Hours of data can be collected remotely, and downloaded afterwards for analysis. Fiberoptic connection allows control from miles away.

Power Solution

The on board battery system is designed to operate with the onboard computer of the Autonomous, and power the Submersible Microscope. Batteries are rechargeable, and there are several power configuration options available.

Depth Setting

Autonomous Modules capable of 2000 meter deployment are the standard.

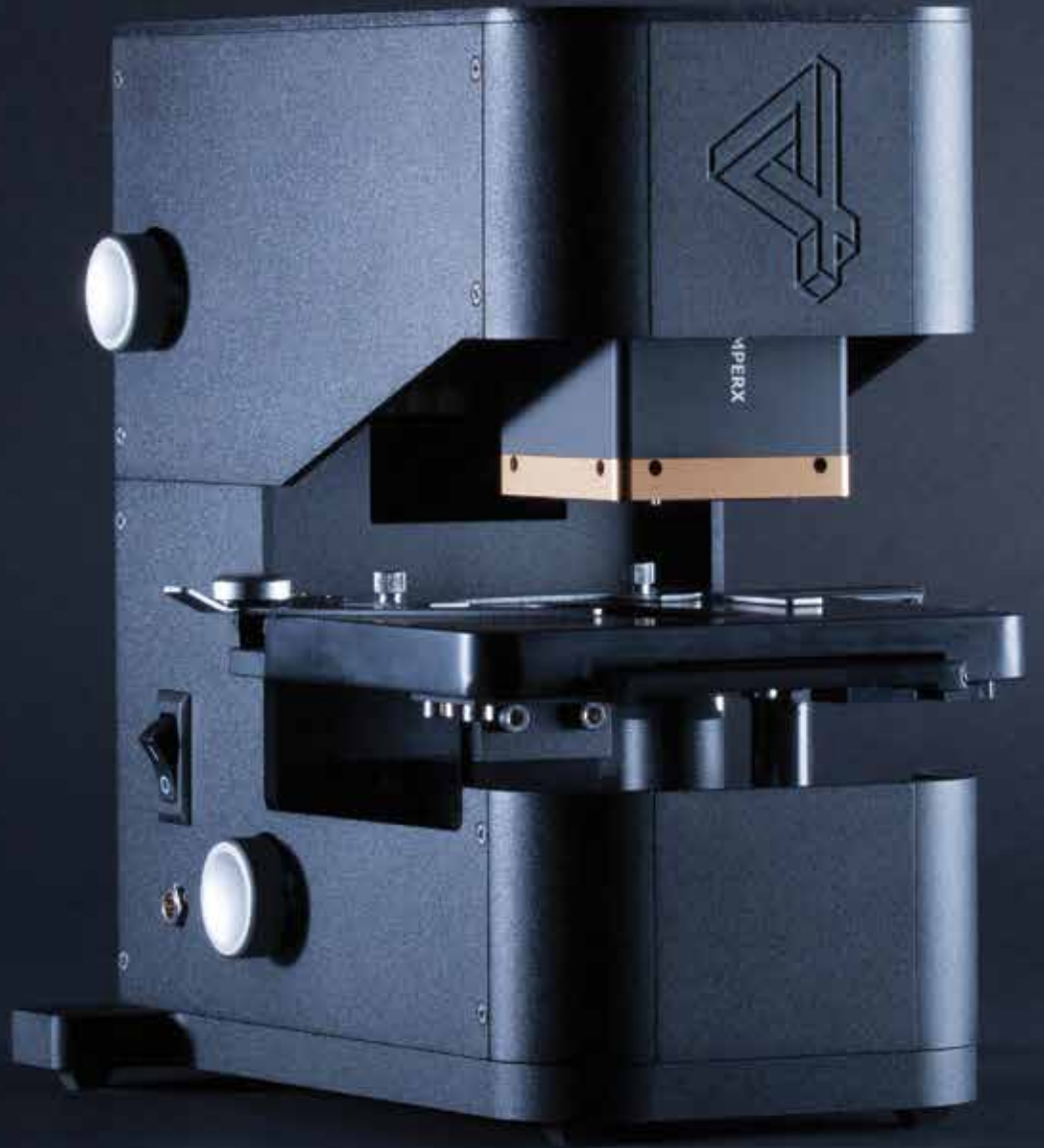
Desktop Microscope

The Desktop

Holography at your fingertips. Precision control over parameters gives the user the best resolution of any of the microscopes offered by 4Deep.

XY & Z

Resolution in the plane is 0.5 micrometers. Along the optical axis, using phase information, a resolution to 0.02 micrometers can be achieved.



Unsurpassed resolution

Cuvette Microscope

The Cuvette

Using standard sized spectroscopic cuvettes, the microscope is portable, easy to use and capable of most imaging details of the larger models.

Workbook Practices

An Instructors Workbook guides the user in the introduction of microscopic holography to a classroom setting, for use in science labs at all levels.



Light Shield

The desktop microscope comes with a shield that can be used to block out ambient light.



Swordfish

Software

Faster

Image based rapid particle detection up to 16 frames per second.

Larger Sample Volume

Detect more particles than with traditional microscopy.

More Control

Particle detection criteria includes size, threshold and shape (round & non-round).



Instantly count & size particles or microorganisms for statistical analysis

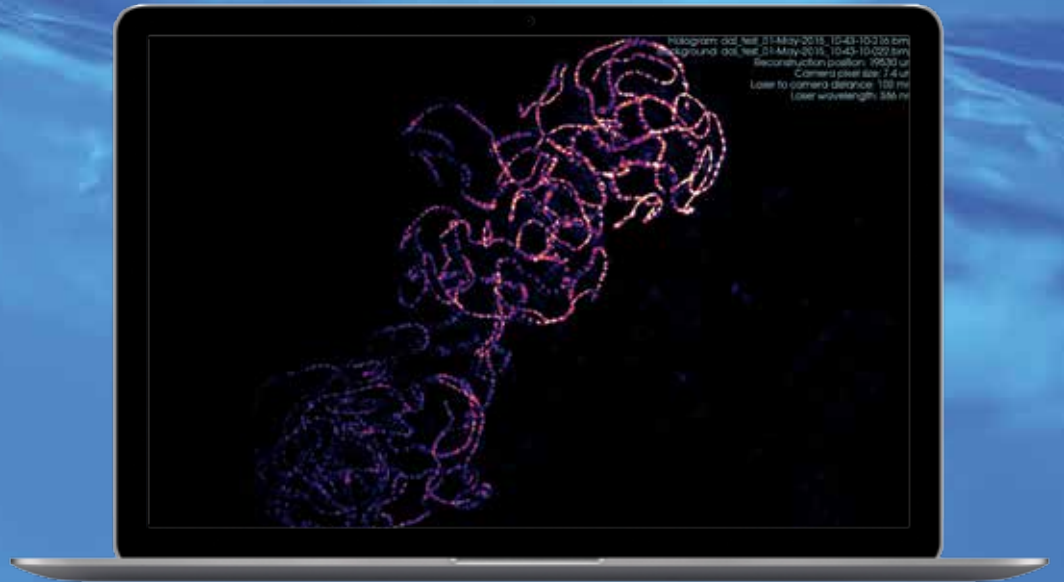
Octopus Software

Explore the Volume

The image plane is displayed in real time, and can be moved throughout the volume with a click.

Incredible Resolution

Image objects up to 2 mm in size, with resolution better than 1 micron.



Imaging Class

Develop publication quality images quickly, include color palates and scales.

Full Contrasts

Holography gives phase information, allowing for quantification of image information; capable of resolving information well below the wavelength of the light.

Analyze & explore objects in free-flowing environments

Stingray

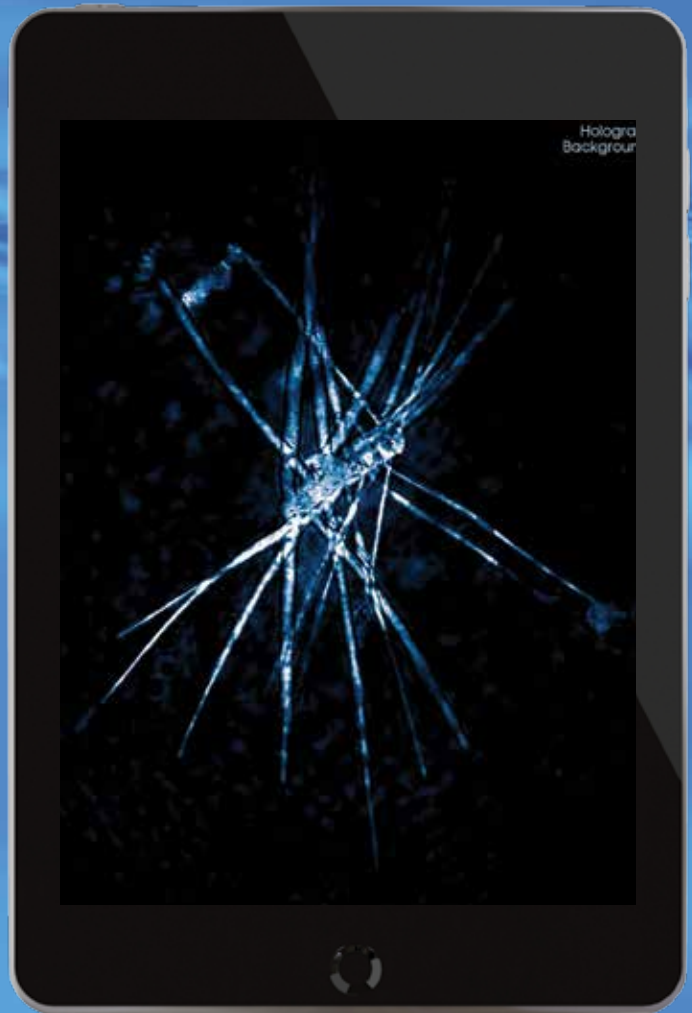
Software

Automated Reconstructions

With Stingray, let the software find the objects in the volume, and have them presented in a list.

Image Classifier

Develop a database of classified images, and train the software to automatically recognize the images in future reconstructions.



Automatic morphology detection & classification

Extras

Enhance functionality

“The flow-through attachment is a pleasant surprise. In addition to flow-through imaging, it works well as a static chamber, recording swimming and organism interactions in an unconstrained fluid environment.”



Flow Chamber

Quickly and easily observe micro-organisms from laboratory specimens, and particles from prepared samples. The Flow Chamber turns the Submersible Microscope into a bench top device.



Brackets

Securely connect the Autonomous Module to the Submersible Microscope for deployment.



“

The Submersible Holographic Microscope from 4Deep is the best tool I've encountered for microscopic imaging from autonomous platforms. It's small size and fast sample rate allows me to collect impressive stacks of phytoplankton and marine snow particle images.

Their customer service is unparalleled. I am extremely satisfied with their products and service.

”

Melissa Omand Ph.D.

Assistant Professor

Graduate School of Oceanography

University of Rhode Island

“

First & foremost, 4Deep is interested in developing the tailored product that will work towards customer needs, which is very rare in current business environments.

”

Zoran Ljepović

Director QA

Wine Microbiology & Sanitation

Constellation Brands

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Inwater Imaging

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