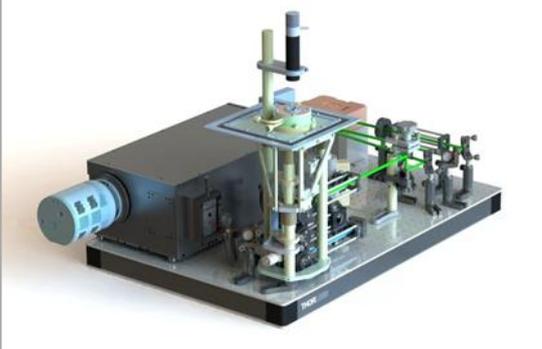
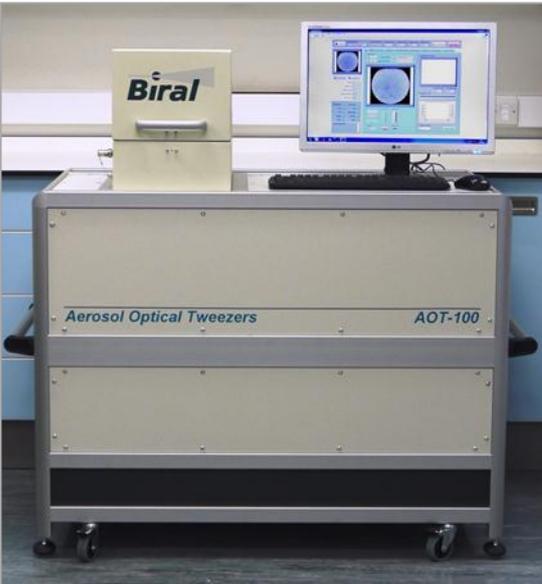


AOT-100 Aerosol Optical Tweezers

An integrated system for trapping and holding aerosol particles for extended study

... built-in analysis software from the University of Bristol Aerosol Research Centre

- Particles held in a highly focussed laser trap
- Simultaneous trapping of multiple particles
- Size measureable with nanometre resolution
- Highly sensitive refractive index measurement
- Time resolution less than 1 second
- No specialist skills required
- Optically safe for use in any laboratory environment



Aerosol Optical Tweezers (AOT) offers a step-change in what can be achieved in the measurement of airborne particles.

Most single particle aerosol characterisation instruments make measurements on particles as they transit a measurement space. This provides a snapshot of the particle characteristics at the time of measurement but cannot follow changes to the particle characteristics over extended periods of time.

The AOT, on the other hand, holds particles in an optical trap for as long as is required and this enables measurements that would be impossible in a transit. Changes to the chemical and physical characteristics of the particle can be monitored with time and with changes to the environment in which it is being held.

The instrument is equipped with the means to continuously control and monitor the humidity of the gaseous medium in which the particle is suspended. This provides a means of studying, for example, the chemistry of cloud droplets or the changes that occur when particles are inhaled.

Trapping droplets offers the unique ability to measure and monitor changes in particle size with exceptional

sensitivity (<1nm) and time resolution (<1s). This is achieved by exploiting the Whispering Gallery Mode amplification of Raman scattering from chemical constituents of the droplet, such as water.

The same technique also enables the refractive index of particles to be measured and monitored with an accuracy ($\pm 0.05\%$) that could not be achieved by any other method.

The system is provided with a suite of software tools that both control the instrument functions and process the raw data. So the range of measured particle properties, such as size and refractive index, can be directly monitored alongside any changes to the microscope image of the particle.

The AOT is a tool that can be used for a very wide variety of research objectives many of which may be novel. The instrument has been designed to provide a range of techniques that have had extensive development and have been shown to be reliable. However, the components and design of the system offer a high degree of flexibility that should enable the development of new applications. Biral would be very happy to discuss and offer advice on the feasibility of such applications.

AOT-100 Specifications

Particle Measurement

Particle radius	3 μ m to 10 μ m
Particle geometry	Spherical (outer shell)
Particle material	Transparent to 532nm light
Number of particles trapped simultaneously	1 - 4

Measurement Capabilities

Particle size resolution	1nm
Real refractive index	0.05% accuracy
Imaging	100x microscope objective
Raman spectral resolution	0.037nm at 650nm

Power Requirements

Power supply	90 – 264 V DC, 47 – 63 Hz
Power consumption	750 W

Additional features

Humidity control	0% - 100%
Reagent delivery	Non-corrosive gases and vapours

Environmental

Operating temperature	+15°C to +30°C
Operating humidity	Non-condensing

Certification & Compliance

CE certified
EMC compliance with EN61326-1997, 1998, 2001
RoHS and WEEE compliant
Class I Laser Safety

Physical

Length (mm)	1356
Depth (mm)	720
Height (mm)	1289

Maintenance and Calibration

Measurement cell	Removable for cleaning
Laser window	User replaceable
Spectrograph	Calibration lamp supplied

Included with sensor

Control and analysis software

Specifications subject to change E.&O.

