

## Diode Laser Detection of Peroxy Radicals in the Atmosphere

### Objectives

The aim of this feasibility study is to construct a device and assess its performance in the detection of peroxy radicals  $RO_2$  by resonant cavity diode laser absorption. In-situ measurement of these radicals has proved a difficult task, particularly when chemically distinct species need to be characterised in order to model their individual effects on the polluted troposphere.

### Approach

The first stage of the study is to construct the narrow band diode lasers. The project participants have experience of this, having made two such systems for use at 780 and 660 nm for studies of the  $N_2^+$  ion in plasmas, and in particular, have designed extremely low noise power supplies, frequency scanning units and modulation systems that are essential for the sensitivities required. The next stage is to test the absorption on known concentrations of the different peroxy species. At the same time, the tuned cavities will be built. Designs for the cavity length control electronics already exist, as similar resonant cavities for frequency doubling diode laser radiation to form cw uv light are used by the project participants. The final stage will be to assess the operation of the cavity, for example, by introducing known low concentrations of the radicals and measuring the absorption.

### Start date/duration

August 1998      Nine months

### Lead Organisation

Oxford University

### Deliverables

The study will demonstrate that a relatively simple, portable apparatus which can be easily controlled electronically and requires low electrical power, can be used to detect these atmospherically important radicals. If the calculated detection limits are demonstrated, this will open up the use of such instruments in urban pollution studies.

### Further Details

Further information is available from the following contacts:

Lead Researcher: Prof G Hancock

Tel: 01865 275439, Fax: 01865 275410, e-mail: hancock@physchem.ox.ac.uk

URGENT Programme Manager: Graham Leeks

Tel: 01491 692203, Fax: 01491 692313, e-mail: gjll@ceh.ac.uk