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New laser applications on the THz/FarIR beamline at the Australian Synchrotron

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Currently, lasers are being introduced to the THz/FarIR beamline at the Australian Synchrotron. This will allow some new techniques such as steady state pump probe, photolysis and pyrolysis experiments to be undertaken at the beamline. We currently have a high powered cw CO₂ laser and a pulsed YAG laser.

At the THz beamline, an Enclosive Flow Cooling (EFC) cell is available for use. The EFC cell is a White type cell with a nominal optical path length of 625mm; it can be cooled either with liquid helium or liquid nitrogen, or can be operated up to 400K with a temperature stability of ± 1 K per day. It is usually operated under vacuum ($\sim 10^{-3}$ mbar) but can be pressurized up to 2000 mbar. Cooling not only simplifies complex molecular spectra but also enables the generation of molecular clusters.

The capabilities of the cooling cell will be further developed by adding multiple laser sources, thereby allowing a host of sunlight driven reactions to be studied and providing a source of radicals such as OH or halogens.

For species with half lives of the order of fractions of a second or more, thermal or photolytic breakdown of a gas stream containing specifically designed precursor molecules has been successful in previous experiments.

Sunlight driven reactions are incredibly important for atmospheric studies. An example of this is so that we can understand processes relevant to ozone formation and depletion and investigate various aerosols that contribute to this.

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Primary author: PLATHE, Ruth (Australian Synchrotron)

Co-authors: Dr ENNIS, Courtney (Australian Synchrotron); Dr APPADOO, Dominique (The Australian Synchrotron)

Presenter: Dr APPADOO, Dominique (The Australian Synchrotron)

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