New laser can point the way to new energy harvesting

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New ultrafast laser equipment, capable of generating intense pulses of light as short as a few femtoseconds from the UV to the Infra Red, will help scientists at the University of East Anglia (UEA) measure how energy is transferred from molecule to molecule and point the way to molecular structures for exploiting solar radiation.

Funded by a grant from the Engineering and Physical Sciences Research Council, the new laser will be used for 2D electronic spectroscopy experiments that look at the very fastest reactions. By studying how energy transfers in natural and artificial systems such as proteins and molecular materials, researchers will in turn be able to help the design of new nanomachines and solar power collectors.

Steve Meech, Professor of Chemistry at UEA's said: "With this equipment we will be able to develop experiments which probe in exquisite detail the link between the efficiency of light driven processes in natural and synthetic systems and the underlying molecular architecture."

2D electronic spectroscopy is in many ways analogous to the much better known 2D Nuclear Magnetic Resonance method. It uses ultra fast visible light pulses to reveal coupling between electronic states whereas NMR uses radio frequency pulses to measure couplings between nuclear spins.

Twenty years ago most ultrafast experiments relied upon amplified dye lasers. These difficult to use and unstable devices severely limited the

range of experiments possible. Starting with the discovery of the Titanium Sapphire laser, a whole new family of experiments became possible.

"It is because of the amazing stability and reliability of these modern devices that we can even consider 2D optical experiments, which may take days to run", added Meech.

Lesley Thompson, EPSRC's Director of Research Base, said: "The grant for equipment made by our strategic equipment panel will give UEA the tools they need, but EPSRC has also allocated a further £613,000 for staff and collaborations to drive this research forward."

Today's announcement coincides with the inaugural lecture by Professor Alf Adams at the Royal Society in London, to mark the 25th anniversary of his work on strained quantum well lasers, recently named as one of the Top Ten greatest UK scientific breakthroughs of all time.

The lecture, entitled Semiconductor Lasers TakeThe Strain, is the first in a series named in his honour.

Provided by Engineering and Physical Sciences Research Council