

## Improving Fission Fuels: The role of thermal conductivity Presented by: Dr Ed Darnborough (University of Oxford)

Evening Lecture: Thursday 31st January 2019

Doors open from 17:30 for 18:00 start. Refreshments and light buffet provided.

Ridgeway House, Rutherford Appleton Laboratory, Harwell Campus, Didcot, OX11 0QX (Opposite to Rutherford Appleton Laboratory)

## Lecture Synopsis:

High thermal conductivity of fuel is of paramount importance for the efficiency and safety of nuclear fission reactors. Uranium dioxide used in civil reactors worldwide, is a poor conductor of heat and the thermal conductivity reduces throughout fuel 'burn-up'. Most heat in ceramics, like  $UO_2$ , is conducted by phonons which are disrupted as radiation damage changes the periodic nature of the material. This means as time goes on less of the energy from each fission is making it to electricity and the grid, reducing efficiency. This is also a safety issue for loss of coolant like in the Fukushima accident. To try and tackle these issues, new fuels are being developed which have better thermal conductivity.

