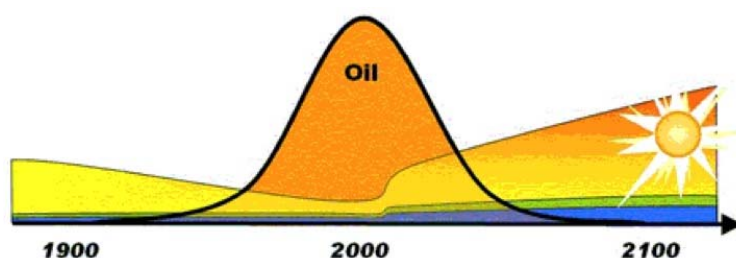
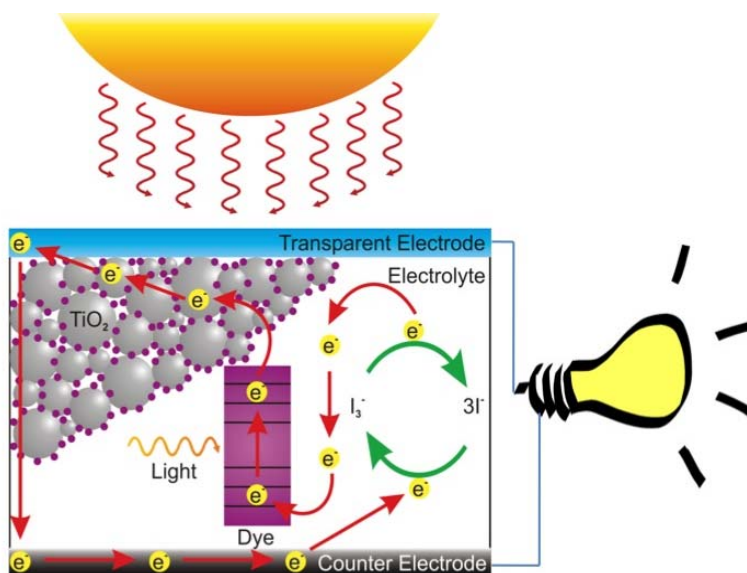


Solar power: Basic structures and mechanisms of dye-sensitized solar cells

The amount of solar energy reaching the surface of the Earth is so vast that in one year it is about twice as much as will ever be obtained from all of the Earth's non-renewable resources of coal, oil, natural gas, and mined uranium combined. Solar power has the potential to provide over 1,000 times the current total world energy consumption, though it today provides only 0.02% of the total. Cheap and efficient solar power would therefore be of enormous importance for our future sustainable energy production.



A dye-sensitized solar cell is a relatively new class of low-cost solar cell, which is based on dye molecules catching light, and transferring the excited electrons into TiO_2 nanoparticles. This takes place in an electrolyte solvent, where iodide and tri-iodide serve as charge carriers. There are a number of questions on the microscopic scale important to increase the efficiency of these solar cells. This includes the relative energy levels of the iodide and tri-iodide ions, the TiO_2 nanoparticles and the solvent molecules, and the existence of other ion-molecule complexes.



You would participate in studies of these issues, first on simple model systems and then progressing towards more realistic systems such as dye molecules adsorbed on solvated TiO_2 nanoparticles. This will be done using synchrotron radiation in collaboration with researchers from the Department of Physical Chemistry, UU.

Interested? Contact Olle Björneholm (olle.bjorneholm@fysik.uu.se)!