

Chemistry for Tomorrow's World

Solar energy



Five times the world's current energy requirement could be generated if 10% of the solar power incident on our desert regions was captured with 10% efficiency.¹ Using energy from the sun has huge possibilities to provide a clean and secure supply of electricity, heat and fuels. However, current solar cell technologies need to be improved to make them commercially viable as widely-used alternatives.

Harnessing the sun's energy effectively will rely on developments made by engineers and scientists; chemistry in particular has a central role to play.

How can the chemical sciences help?

- Manufacturing solar cells is expensive; it requires a lot of energy and the chemical processes involved have high carbon dioxide emissions. The expertise of chemists will be needed to improve and optimise the manufacturing processes to make these more commercially viable and environmentally friendly to produce.
- There are exciting opportunities for a more versatile 'second generation' of solar cells, which chemists are currently helping to develop. Thin-films of semiconducting materials can coat surfaces such as glass and offer a more adaptable way to convert the sun's energy into electricity. Before this becomes a feasible technology, further developments in the materials used are needed and the production processes must be improved.
- A 'third generation' of solar cells promises to deliver an even more versatile thin-film technology; using materials such as novel plastics would allow solar cells to be produced more cheaply on a wide range of different surfaces. This could transform the opportunities and applications available to convert the sun's energy into electricity.
- There is also potential for chemists to further explore how we can take advantage of biological methods to harvest and store the sun's energy. By mimicking photosynthesis, man-made technologies could offer a route to sustainable production of hydrogen (which can be used as a fuel) and could also potentially be a process that removes carbon dioxide from the atmosphere. Chemistry will be essential to developing such technologies.

About the RSC & Chemistry for Tomorrow's World

The Royal Society of Chemistry (RSC) is the leading society and professional body for chemical scientists. Over 2008 and 2009, it gathered expert views to identify priority areas where the chemical sciences can play an important role in the development of society.

For more on this initiative please visit our website:

www.rsc.org/roadmap, contact us at roadmap@rsc.org or call the RSC science team on +44 (0)1223 432424.

¹ Derek Abbott, *Keeping the Energy Debate Clean: How Do We Supply the World's Energy Needs?* Proceedings of the IEEE, Vol. 98, January 2010