

Nobel Prize in Chemistry 2000



Alan J. Heeger



Alan G. MacDiarmid



Hideki Shirakawa

The Nobel Prize in Chemistry 2000 was awarded jointly to Alan J. Heeger, Alan G. MacDiarmid and Hideki Shirakawa *"for the discovery and development of conductive polymers"*.

Information about winners:

Alan J. Heeger

University of California at Santa Barbara, USA,

Alan G. MacDiarmid

University of Pennsylvania, Philadelphia, USA,

Hideki Shirakawa

University of Tsukuba, Japan

Summary of research work:

Plastic that conducts electricity

We have been taught that plastics, unlike metals, do *not* conduct electricity. In fact plastic is used as insulation round the copper wires in ordinary electric cables. Yet this year's Nobel Laureates in Chemistry are being rewarded for their revolutionary discovery that plastic *can*, after certain modifications, be made *electrically conductive*.

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Plastics are polymers, molecules that repeat their structure regularly in long chains. For a polymer to be able to conduct electric current it must consist alternately of single and double bonds between the carbon atoms. It must also be "doped", which means that electrons are removed (through oxidation) or introduced (through reduction). These "holes" or extra electrons can move along the molecule - it becomes electrically conductive. Heeger, MacDiarmid and Shirakawa made their seminal findings at the end of the 1970s and have subsequently developed conductive polymers into a research field of great importance for chemists as well as physicists. The area has also yielded important practical applications. Conductive plastics are used in, or being developed industrially for, e.g. anti-static substances for photographic film, shields for computer screen against electromagnetic radiation and for "smart" windows (that can exclude sunlight). In addition, semi-conductive polymers have recently been developed in light-emitting diodes, solar cells and as displays in mobile telephones and mini-format television screens.

Research on conductive polymers is also closely related to the rapid development in molecular electronics. In the future we will be able to produce transistors and other electronic components consisting of individual molecules - which will dramatically increase the speed and reduce the size of our computers. A computer corresponding to what we now carry around in our bags would suddenly fit inside a watch.

For more details please visit:

http://www.nobelprize.org/nobel_prizes/chemistry/laureates/2000/popular.html