

The Nobel Prize in Chemistry 2000
Alan Heeger, Alan MacDiarmid, Hideki Shirakawa

Nobel Prize, 2000

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Press Release

October 10, 2000

The Royal Swedish Academy of Sciences has decided to award the Nobel Prize in Chemistry for 2000 jointly to

Alan J. Heeger
University of California at Santa Barbara, USA,

Alan G. MacDiarmid
University of Pennsylvania, Philadelphia, USA,

Hideki Shirakawa
University of Tsukuba, Japan

"for the discovery and development of conductive polymers"

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*.

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 ...

Alan J. Heeger, 64, was born in 1936 in Sioux City, Iowa, USA (US citizen). He is Professor of Physics and Director of the Institute for Polymers and Organic Solids at the University of California at Santa Barbara.

Alan G. MacDiarmid, 73, was born in 1927 in Masterton, New Zealand (US citizen). He is Professor of Chemistry at the University of Pennsylvania.

Hideki Shirakawa, 64, was born in 1936 in Tokyo (Japanese citizen). He is Professor of Chemistry at the Institute of Materials Science, University of Tsukuba, Japan.

The Prize amount, SEK 9 million, will be shared equally among the Laureates.

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