

ELECTRICAL CONDUCTIVITY OF ORGANIC AND INORGANIC NANOWIRES

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Since 1998 [1], the authors and co-workers have developed multi-probe scanning tunneling microscopes (MP-STMs), in which two, three or four probes are operated independently. Every probe of the MP-STMs can observe STM images independently, but the main role of the multiple probes is to work as nanoscale contact electrodes for measuring electrical conductivity at the nanoscale. By using MP-STMs, we measured the electrical conductivity of organic and inorganic nanowires, i.e., single-walled carbon nanotubes (SWCNTs), erbium disilicide (ErSi₂) nanowires, etc. We also studied the electrical conductivity of polydiacetylene (PDA) nanowires, controlled metallic point contacts (in an atomic switch), short chains of polymerized fullerene (C₆₀) molecules, etc. using related measurement methods. On the basis of the experimental results obtained, we would like to discuss the variety of electrical conduction in those nanowires, i.e., quantized, polaronic and ballistic conduction, as well as a possibility of superconductivity.

[1] M. Aono, C.-S. Jiang, T. Nakayama, T. Okuda, S. Qiao, M. Sakurai, C. Thirstrup, Z.-H. Wu: *Oyo Butyri (Applied Physics, Japan Society of Applied Physics)* **67**, 1361 (1998) (in Japanese); A brief English abstract is available on INSPEC.