

Award Achievements

The 2nd Heinrich Rohrer Medal –Grand Medal–

Dr. Joseph A. Stroscio

"For his pioneering achievements on spectroscopic capability of scanning tunneling microscopy opening novel perspectives for revealing the quantum nature of the nano-world"

Dr. Stroscio has been a leading scientist in surface/nano science field throughout his career. His major contribution is the first successful measurement of scanning tunneling spectroscopy (STS). Dr. Stroscio together with Dr. Feenstra showed that the local density of state at a site of interest in addition to surface structures could be measured by taking the first voltage derivative of the tunneling current. This idea could not be realized unless they added an extra feedback circuit to nullify a thermal drift of STM at room temperature. STM thus became a tool with combined power of transmission electron microscope and photoemission spectroscopy with an atomic resolution. He was the first person who showed a local electronic structural map of Si(001)-2×1, revealing the surface bandgap and a π -bond nature of Si dimers. He demonstrated the chemical identification of Ga and As atoms on a GaAs(110) surface, and identified various gap states and their electronic influence to GaAs surfaces.

Stroscio's other landmark contributions to surface/nanoscience involved manipulation of atoms with the scanning tunneling probe. This finding ushered in an unparalleled era of discovery about the nanoworld. His passion in advancing instrumentation led to the design and construction of STMs operating at milli-Kelvin temperatures, dramatically improving the energy resolution down to tens of μeV . With these systems he succeeded in unveiling the quantum mechanically degenerate energy states in graphene and topological insulators.

With his great contributions in STS, atom manipulation, and ultra-high energy resolution STM, scanning tunneling microscopy/atomic force microscopy have become the most important structural and spectroscopic tools with atomic resolution and μeV energy resolution, leading to many new scientific discoveries in surface science and nanotechnology.

