ICN+T 2006: New Method for the Construction of Future Molecular Data Storage Media and Nanoscale Switches

ICN+T 2006: New Method for the Construction of Future Molecular Data Storage Media and Nanoscale Switches. Scientists from the NCCR Nanoscale Science developed a new method which allows the construction of complex 2-dimensional nanosized structures out of molecular building blocks. Such entities may be used for future memory devices with unprecedent high storage densities or as switching elements in nanoscale technology. As reported in “Angewandte Chemie”, single molecules were forced to arrange in stable molecular chains and regular pairs on a surface by a self-assembly process at room temperature.

At present, no other technological method is capable of arranging that complex supramolecular entities, made of several hundred atoms, in such a precise and repetitive manner.

It was shown that the formation of the structures is driven by the internal (conformational) flexibility of the molecular building blocks. Binding of a fullerene molecule (C60) at the surface blocks selected neighbouring binding sites. Therefore, additional molecules only occupy defined adsorption positions, which leads to the observed creation of molecular chains and pairs. Interestingly, the flexibility of molecules also plays a decisive role in important biochemical and physiological processes (e.g. oxygen transport in the blood circuit).

In this work, the flexibility of molecules has been used for the first time for the construction of artificial surface structures.

In order to investigate the nanosized structures with atomic resolution, a Scanning-Tunneling-Microscope was used. This allows the targeted manipulation of single molecules from one stable position to another one. A detailed understanding of these switching processes is of outmost importance, especially for the construction of future memory devices.

References

Contact:
Dr. Hannes Spillmann