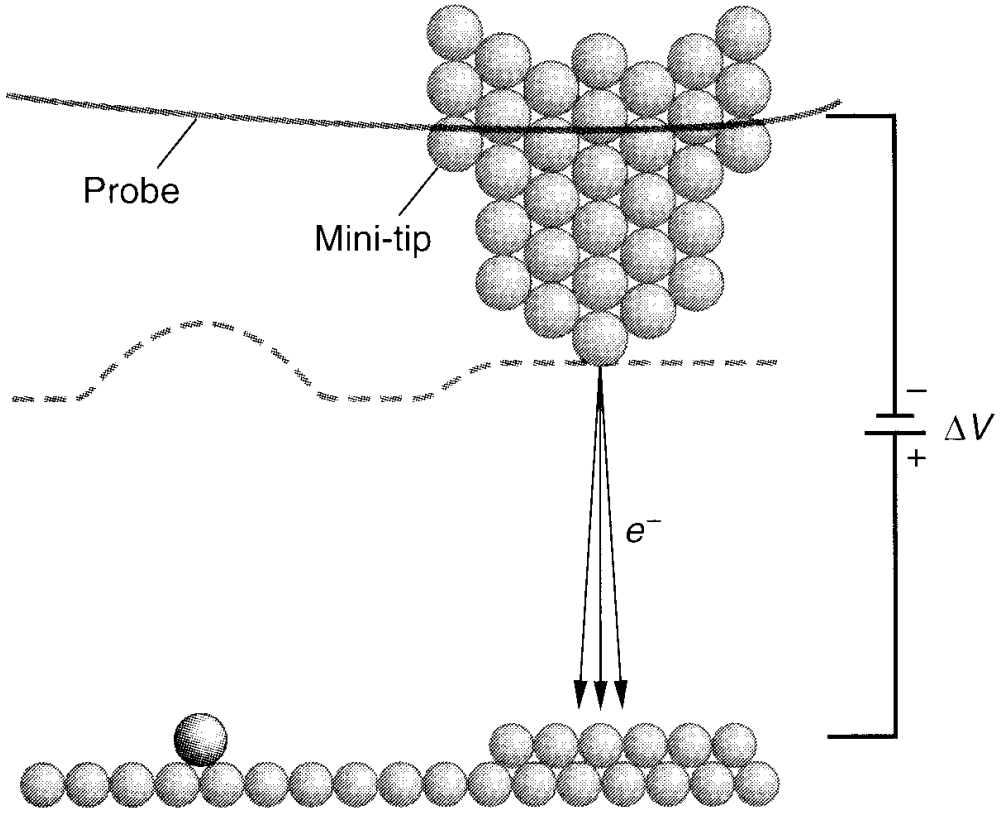
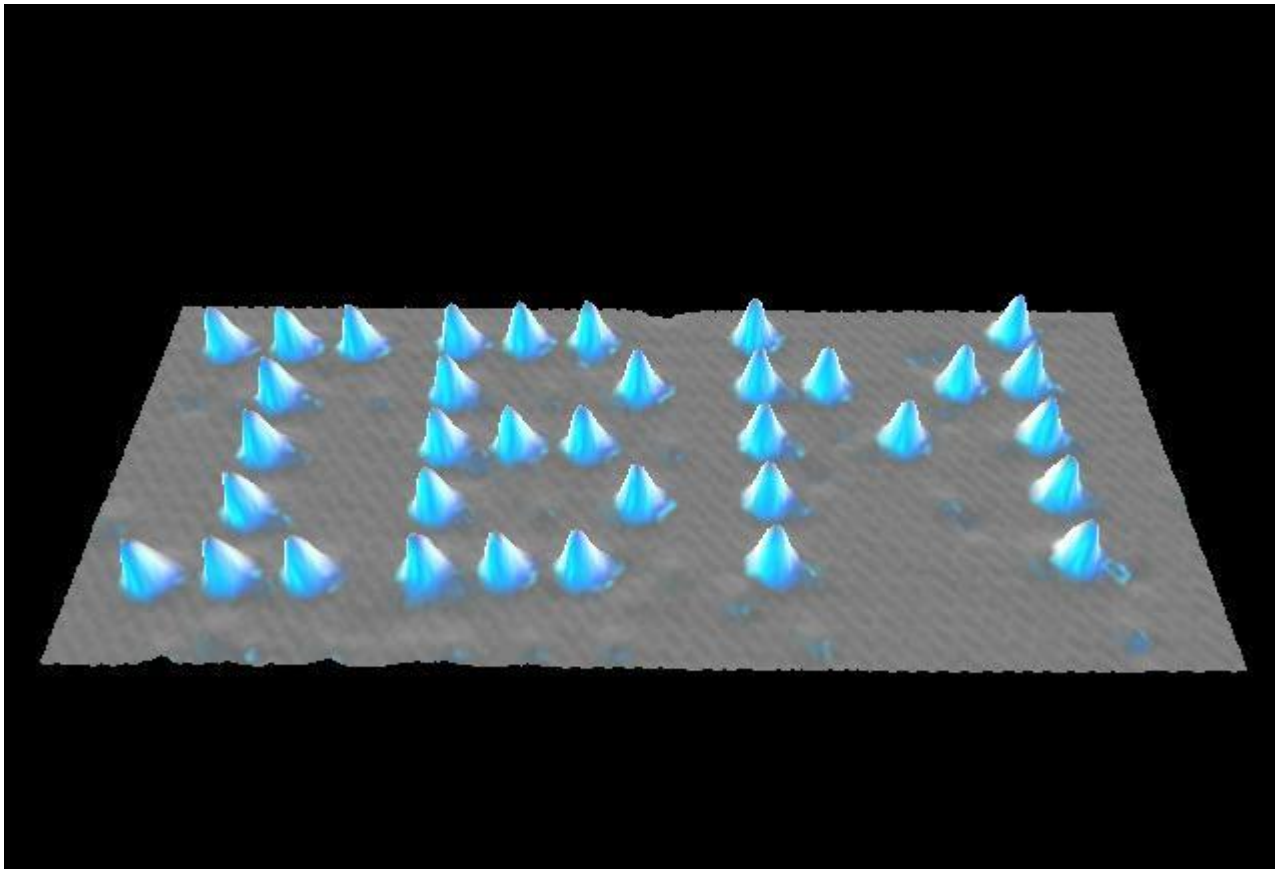
SCANNING TUNNELING MICROSCOPE (STM)

Developed in the 1980's, a thin space between a material specimen and a tiny probe acts as a barrier to electrons bound in the specimen or probe. A small voltage applied between the specimen and probe cause electrons to tunnel through the vacuum separating the two surfaces if the surfaces are close enough together. The tunneling current is extremely sensitive to the size of the gap between the probe and specimen. If a constant current is maintained as the probe scans the specimen, the surface of the specimen can be mapped out by the motions of the probe. In this way, the surface feature of a specimen can be measured with a resolution of the order of the size of an atom.



In 1989, IBM scientist Don Eigler (at San Jose, CA) discovered that in addition to using the STM to look at atomic atoms, he could also use the STM as a pair of tweezers to move single atoms! They used the STM to move individual atoms of the gas Xenon that had been cooled to extremely low temperatures so that they sat still, to spell out “IBM” on a nickel surface.



DECAY OF BLACK HOLES

Black holes are extremely massive bodies that not even light can escape from it and thus cannot be seen visually! However, according to Quantum Mechanics a black hole can emit a variety of particles by the process of Tunneling through the gravitational potential barrier surrounding the black hole. As the black hole emits particles its mass and size decreases steadily, making it easier for more particles to tunnel out, and eventually radiating itself out of existence.

A black hole with the mass of our sun would survive for 10^{66} years before it decays completely by tunneling!