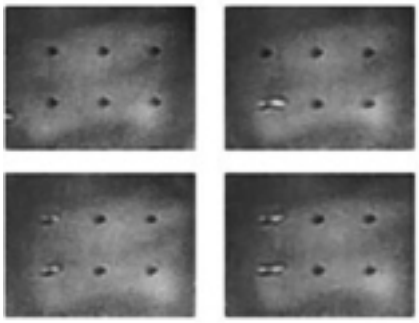
Prof. Romain Quidant's group has managed to achieve non-invasive and orientational trapping of living E.Coli bacteria with Resonant Optical Antennas.



Bacteria trapped by an
array of gold antenna
tweezersA paper published in Nanoletters by Prof. Romain Quidant's group, in collaboration with researchers at the CSIC-Optics Institute of Madrid, presents a new technique that allows trapping and aligning bacteria without killing them by means of an ultra-concentrated light spot. The new break through was developed partially thanks to the generous donation of the Fundació Cellex Barcelona. Until now, the most perfect lenses were able to concentrate light in a spot of about a micrometer. In a report published in Physical Review Letters and highlighted in Nature at the end of last year, Prof. Romain Quidant's group managed, in collaboration with Prof. Niek van Hulst's group, to concentrate light in a spot one hundred times smaller. The ultra-concentrated light spot has been obtained by means of a resonant optical antenna consisting of two gold rods, each 500 nanometers long.

In their recent paper published in Nanoletters, researchers have proved that this device can be used as record-breaking optical tweezers. Conventional tweezers do not work well to immobilize nano-size objects much smaller than the trap size. In addition, for small biological organisms, such as bacteria, the laser intensity required for trapping them causes irreversible damage. However, ICFO researchers have demonstrated that the tight light spot created near their gold antennas is able to catch polystyrene beads as small as 200 nanometers. Moreover, the intensity of light they need is extremely low, so that it can be applied to safe trapping of E. coli bacteria. Experiments, performed by Maurizio Righini, have confirmed that their biological parameters remain normal after trapping. Moreover, the new tweezers have the ability to systematically align the bacteria along the long axis of the antenna offering new opportunities for their optical inspection.