

The potential of Surface Plasmons to manipulate with light small objects down to the nanometer scale is the subject of a review article co-authored by ICFO group leader Romain Quidant.



Cover of LPRThe use of Surface Plasmons (SP) in optical manipulation has a great potential for developing new integrated optical devices, according to a review co-authored by ICFO group leader Romain Quidant, that makes the cover of Laser&Photonics Reviews (LPR).

The possibility to trap and manipulate micrometric particles by means of a strongly focused light beam (optical tweezers) has been applied since its first introduction by A. Ashkin in 1970 to a wide variety of objects, ranging from DNA to colloidal particles. However, optical tweezers suffer from two main limitations which have reduced their applicability range. First, they require bulk optics incompatible with ultimate miniaturization. Second, diffraction prevents direct manipulation of objects much smaller compared to the incident wavelength.

In the last few years, it has been suggested to make use of SP fields as an alternative method that overcomes these difficulties. In their article in LPR, Romain Quidant and Christian Girard (researcher at CNRS, Toulouse) report the last advances and the potential developments of this novel field. SP appear as a result of the interaction of light with free electrons in a metal and can be used for trapping by means of chips made of transparent surfaces patterned with metal structures. In addition to provide enhanced trapping, SP fields are also expected to achieve further spatial confinement down to the nanometer scale. The simplicity and flexibility of SP-based optical manipulation prepare the new generation of analytical devices where the analyte would be manipulated, arranged and analyzed at the chip surface for low cost and parallel bio-analysis.