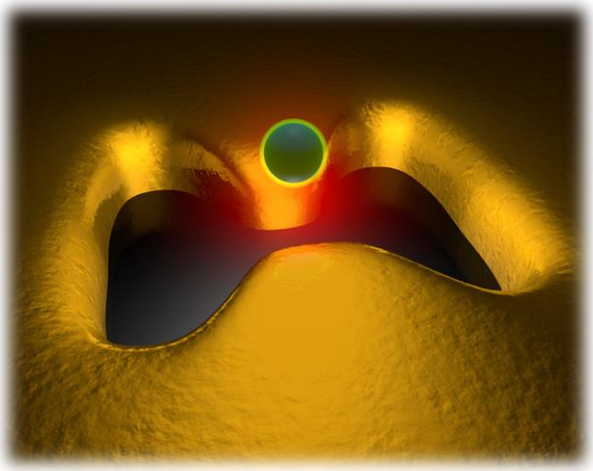
Optomechanics with plasmonic trapping

J. Berthelot[1,2],P. Mestres[1] ,S. S. Acimovic[3], R. Quidant[14]

1. ICFO-Institut de Ciencies Fotoniques, The Barcelona Institute of Science and Technology, 08860 Barcelona, Spain and
2. Aix Marseille Université, CNRS, Centrale Marseille, Institut Fresnel UMR 7249, 13397 Marseille, France
3. Department of Applied Physics, Chalmers University of Technology, Fysikgränd 3, SE-412 96 Göteborg, Sweden
4. ICREA-Institució Catalana de Recerca i Estudis Avançats, 08010 Barcelona, Spain

Recent advances in nanotechnologies have prompted the need for tools to accurately and non-invasively manipulate individual nano-objects [1]. Self-induced back-action (SIBA) trapping in nano-optical cavities has shown the unique potential for trapping and manipulating nanometer-sized objects under low optical intensities [2, 3]. In this regime, the cavity resonance is directly modulated by the position of the trapped object resulting in a dynamic optical trap. Taking advantage of this effect, allows a decrease of at least 2 order of magnitude compare with conventional optical tweezers. Here, I will present for the first time direct experimental evidence of the self-reconfiguration of the optical potential that is experienced by a nanoparticle trapped in a plasmonic nanocavity. These experimental observations will help in the understanding and development of efficient SIBA-based optical nano-tweezers.



1 O. M. Maragò et al, Nature Nanotechnology, **8**(11), 807–19 (2013).

2 Juan ML, Righini M, Quidant R. Plasmon nano-optical tweezers. Nat Photon, 5, 349–356 (2011)

3 J. Berthelot et al., Nature Nanotechnology (2014)