3-D nanoscale imaging made possible

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Imaging at the nanoscale is important to a plethora of modern applications in materials science, physics, biology, medicine and other fields. Limitations of current techniques are, e.g. their resolution, imaging speed or the inability to look behind opaque objects with arbitrary shapes.

However, imaging like this would be useful e.g. for investigating spongy electrodes, thus helping to increase capacity and charging speed of next generation batteries.

In a research article "3-D Nano-scale Imaging by Plasmonic Brownian Microscopy" published today in Nanophotonics, the team around Prof. Xiang Zhang from the University of California in Berkeley demonstrate a method with stunning properties.

"We wanted to overcome limitations of current nano imaging techniques and are excited to have found a way to image complex 3d nanostructures even with intricate internal structures such as cavities," explains Prof. Zhang.

Nanoparticles are immersed in a fluid surrounding the object under investigation. By exploiting their special properties when interacting with light, each of the particles acts as a light source, thereby probing the object from all sides, also behind overhangs and inside any cavities. With a resolution of 30nm in all direction, this new technique offers true 3-D imaging at the nanoscale.

Besides applications in the technology sector, Plasmonic Brownian Microscopy may also be used to map out the biological machinery inside single cells, especially those with intricate internal structures. This would help to further our understanding of the basic mechanisms of living organisms and may give rise to new medical solutions.

More information: Anna Labno et al. Three-dimensional nanoscale imaging by plasmonic Brownian microscopy, *Nanophotonics* (2017). DOI: 10.1515/nanoph-2017-0075

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