Gerd Kaupp, J Bioproces Biotechniq 2016, 6:7(Suppl)
http://dx.doi.org/10.4172/2155-9821.C1.008

4th International Conference on

Bioprocess and Bio Therapeutics

October 20-21, 2016 Houston, USA

Gerd Kaupp

University of Oldenburg, Germany

Local apertureless SNOM for biomaterials without staining much higher resolving, more versatile, easier, and cheaper than stochastic STED and PALM

The present hype with stochastic imaging of fluorescence dyes like STED, PALM, etc., providing only slightly submicroscopic optical resolution, had long been preceded by uncomplicated and much better resolving apertureless shear force SNOM (scanning near-field optical microscopy). Only the latter technique applies to all types of unstained flat or rough real-world materials' surfaces (dielectric, semi-conductive, metallic, fluorescing, non-fluorescing) at local optical resolution down to <9 nm, and it additionally provides topography. It is versatile, easy, and cheap. The artifacts of apertured SNOM are avoided. Basically, an uncoated illuminated sharply tapered dielectric waveguide tip of a shear force AFM is vibrated at shear force distance and the light reflected back to the silica waveguide is coupled out, measured, and or diffracted. A commercial laser puller provides 10-20 nm end radii at almost no cost. Metal coating is unnecessary due to our unexpected physical effect of strong materials' dependent near-field enhancement of reflectivity (2-50 fold; not only for metals). This provides chemical contrast. We resolve local molecular reactions on crystals, characterize nanoparticles, measure local Raman- or fluorescence-spectra for identifications and diffusion coefficient determinations, distinguish organelles in bio-cells, resolve details within organelles, detect localize cancer, judge blood bag performance and nano-pitting of implant materials. Nothing of that is available from the expensive stochastic techniques. Furthermore, these chemically bind fluorescing dyes to biomaterial, which inevitably changes their structure (hydrogen bonding, coiling, etc.). Thus, any conclusions from their highly acclaimed stochastic images urgently require reality check by the preceding superior and more versatile apertureless SNOM.

Biography

Gerd Kaupp has completed his PhD from Würzburg University and Post-doctoral studies from Iowa State University, Lausanne University, and Freiburg University. He held a Full-Professorship till 2005 in Oldenburg Germany, and privately continues his research on Wasteless Solid-State Chemistry (since 1984), AFM on rough surfaces (since 1988), the non-stochastic but versatile and better resolving sub-diffraction-limit microscopy for unstained non-fluorescing materials of all types (resolution <10 nm, since 1995), and nano-indentations (since 2000). He has published more than 300 papers in renowned journals and has been serving as an Editorial Board Member of several scientific journals.

gerd.kaupp@uni-oldenburg.de