OLE Topic of the Month: The Promise of Plasmonics

Prof. Niek van Hulst comments on the progress and potential of plasmonics in an interview in Optics.org and OLE (Optics & Laser Europe).

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Sensing, imaging and spectroscopy are some of the fields that will greatly benefit from the development of plasmonics, according to an interview by Marie Freebody with Prof. Niek van Hulst in Optics.org. Plasmonics is the science, technology and application of plasmons, which are the collective oscillations of a free electron gas (plasma). Energy carried by plasmons allows for light localization in ultrasmall volumes. The localized nanoscale fields come together with large field enhancements, which is a major advantage for new applications.

Novel plasmonic biosensors, optical imaging systems with nanometer-scale resolution,

hybrid photonic-plasmonic devices and negative-index metamaterials are some of these applications, according to Prof. van Hulst. Plasmon antennas and plasmonic nanocircuits are other examples he cites.

The coherent control of nanoscale localized optical fields and the efficient local trapping of particles by plasmonic forces are important recent advances in the field, states the interviewee, and the next big breakthrough could come from plasmonic lasers and plasmon-assisted quantum optics. Key challenges left to overcome in this field are reproducible nanofabrication techniques, use of crystalline materials and the development of inexpensive replication methods.

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