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Editorial

Plasmonics

Manipulation of light is a central feature of modern society, encompassing displays, communication, research, biomedical testing and astronomy, to name but just a few. Almost all these applications of light use photons migrating in space or transparent media, that is, far field radiation. The use of far field radiation imposes restrictions on optical resolution. Free space radiation cannot be manipulated as easily as electrons in wires.

The field of light manipulation and transport is rapidly changing as the result of nanophotonics technology which is allowing the near-field manipulation of light energy. This paradigm shift is facilitated by this new and emerging field of *plasmonics*.

Surface plasmons are electron oscillations on the surface of metals. These plasmons are usually non-radiative and difficult to put to practical use. However, surface plasmons are easily generated or indeed manipulated using appropriate metal structures, such as subwavelength thick metal films. Plasmons can also be made to radiate into free space by using metallic nanostructures of appropriate size and shape.

The use of surface plasmons introduces numerous new opportunities in computer technology, biosensors, such as in DNA technology, and imaging. Metallic structures can be used to transform far field radiation into subwavelength localized electric fields. These fields can be used for high resolution imaging, initiating non-linear processes and creating microcavities with extreme sensitivity to low concentrations of chemicals.

Surface plasmons are already in use in many areas of science, such as near-field scanning optical microscopy (NSOM), Raman Spectroscopy, DNA analysis by colloid-colloid interaction, and the measurement of bioaffinity reactions. Important work is now emerging which allows structures to be engineered which facilitate long range propagation of plasmons, directional light transmission, and the creation of elements which turn, reflect, or focus plasmons. There is presently an explosion of information on plasmonics which is appearing in a wide variety of journals from optics, physics and the chemical and biological sciences.

Under the umbrella of this special issue we have invited together leading edge scientists who have engaged problems in this emerging scientific discipline. We have organized this special journal issue on Plasmonics to include contributions on Biosensing, DNA detection, metal-enhanced fluorescence and glucose sensing using gold and silver metallic colloids, to name but just a few, that will hopefully give readers the opportunity to visualize the extent of research currently being undertaken in plasmonics.

In conclusion we would like to thank all the authors for their invaluable and timely contributions which reflect well, some of the current uses of plasmonics in fluorescence. Finally, in closing we would like to thank Mary Rosenfeld for helping us compile this special journal issue.

Kind Regards

Chris D. Geddes, PhD, and Kadir Aslan, PhD
Special Issue on *Plasmonics* Editors
Institute of Fluorescence and Center
for Fluorescence Spectroscopy
Medical Biotechnology Center
University of Maryland Biotechnology Institute
725 West Lombard St
Baltimore, Maryland 21201
E-mail: Chris@cfs.umbi.umd.edu