Parinda VASA

Home Country
India

Degree
Post-Doctorate in Ultrafast Nano-Optics and Physics

Expertise
Physics

Research Focus
Nano-Optics and Exciton-Plasmon Interactions in Metal Hybrid Structures

Host University
Carl von Ossietzky University, Germany

Fellowship Awarded
2008

Parinda Vasa was born in India. Her research focus is on very small metal structures that show the remarkable property of concentrating light over extremely small regions of space. The light energy is stored in a new form of excitation known as Surface Plasmon Polaritons (SPPs).

As electronics deals with developing devices based on electron transport, plasmonics is a field in which novel devices based on SPPs are designed and investigated. It is an emerging field of research and is challenging due to the extremely short SPP lifetimes and the small (nanometer) spatial scale of SPP localization. Plasmonic devices have tremendous advantages in comparison with conventional optical devices. They offer miniaturization similar to that in electronics and the potential of parallel ultrafast processing. Terabit processing rates, as compared to the conventional gigabit rates of today's electronics, seem within reach.

However, the metal structures have high losses and hence SPPs cannot propagate through them over long distances. A possible way to overcome losses is to amplify SPPs in a gain medium similar to the method used for light in lasers. SPP Amplification by Stimulated Emission of Radiation (SPASE R) in metal-semiconductor hybrid structures is very promising. Semiconductor nanostructures (e.g. quantum wells) offer very high gain coefficients and may thus serve as SPP amplifiers. So far, such a device is only theoretically predicted.

Parinda is investigating metal-semiconductor hybrid structures for the possibility of SPP amplification and lasing. She and her colleagues have successfully observed and theoretically modeled
the interaction between SPPs excited on a metal grating with excitons in a semiconductor quantum well. The possibility of forming different active and passive optical elements using such hybrid structures is also being explored.

Parinda plans to teach at the Indian Institute of Technology.