Lecture I: Sculptured Thin Films

Date : January 4, 2012 (Wednesday)

Time : 3.00 pm

Venue : Lecture Hall 2, Pusat Pengurusan Siswazah (PPS-new building), UKM Bangi

Abstract:

Sculptured thin films (STFs) are assemblies of nanowires that can be fabricated from many different materials, typically via physical vapor deposition onto rotating substrates. The curvilinear–nanowire morphology of STFs is determined by the substrate motions during fabrication. The optical properties, especially, can be tailored by varying the morphology of STFs. In many cases prototype devices have been fabricated for various optical, biological, and other applications.

Lecture II : Surface Multiplasmonics

Date : January 5, 2012 (Thursday)

Time : 3.00 pm

Venue : Lecture Hall 2, Pusat Pengurusan Siswazah (PPS-new building), UKM Bangi.

Abstract:

Sensing technology based on the excitation of a surface-plasmon-polariton (SPP) wave guided by the interface of a metal and a dielectric material has become very popular. Although several techniques exist to launch an SPP wave guided by the interface of a metal and an isotropic homogeneous dielectric

material, the commonest way is to use the Kretschmann configuration. Both the metal and the dielectric material in this configuration are layers of finite thickness. The metal film's thickness is about 50 nm, whereas the dielectric layer has to be much thicker. On the other side of the metal film is a dielectric coupling material (in the form of a prism), which is optically denser than the dielectric material. Quasi-monochromatic light is launched at an angle to the thickness direction in the coupling material towards the metal film. The fraction of illuminating light that is neither reflected nor transmitted is absorbed. As the angle of incidence increases from 0 deg, a sharp peak in absorbance, accompanied by minuscule reflectance and transmittance, indicates the excitation of an SPP wave. This sharp peak occurs only for p-polarized light, and only one SPP wave of a certain frequency can be excited. The basic characteristic of the excitation of only one SPP wave does not change when the isotropic homogeneous dielectric partner of the metal film is made anisotropic. A far more interesting possibility emerges when the anisotropic dielectric partnering material is a sculptured thin film (STF) that is periodically nonhomogeneous in the thickness direction. A converging light beam with sufficient angular spread can then be used to excite more than one SPP-wave modes simultaneously. The propagation characteristics of different SPP-wave modes are different. Both theoretical and experimental results thus point to the emergence of surface multiplasmonics.