The application of surface plasmon resonance for alcohols identification

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In a composite structure, which contains dielectric-metal interface, wave of electric charge densities can be initiated named surface plasmon-polariton. The wave intensity decreases exponentially in adjacent media meaning that the wave closely localized at the interface does exists. Label-free chemical sensors were realized as the propagation constant of the wave is highly sensitive to the refractive index. Surface plasmons can be exited by incident light flux directed at some specific angle, name surface plasmon resonance with very sharp shape.

In present paper the possibility of identification of several mostly common alcohols such as Methanol, Ethanol, Propanol, Butanol, or Pentanol, which have different refractive indexes has studied. The structure is compose of coupling prism made of rutile (TiO2), thin gold film and amorphous arsenic sulfide (As2S3) thin film. The optimal thickness of gold film was established to be of 40 nm. Resonance angles for each type of alcohol was calculated and was shown that they can be clearly identified. Provided numerical simulations show that optimal thickness of chalcogenide film is 1000 nm.