Design and Fabrication of direction selective filters

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In this talk three approaches to realize novel filter elements based on micro-optical grating structures with a symmetric and asymmetric angle dependent transmission will be presented. An equal efficiency for light incident from positive and negative angles is called symmetric, while a diverging efficiency is denoted as asymmetric. The first approach to realize such angular dependent elements are slanted grating, respectively “jalousie-like” structures. This filter type utilizes multiple reflections and absorption to achieve the angular dependent function. The second concept is the utilization of a double grating, where the two grating layers are misaligned half of one grating period to each other. Depending on the size of the grating period this filter approach benefits either from shadowing in combination with reflection and absorption or from plasmonic effects between the two grating layers in case of the grating ridges are made of metal, for example aluminium. The last approach provides the realization of symmetric and asymmetric direction selective filters by using resonant waveguide gratings. Those gratings are known for their very selective behaviour concerning wavelength, polarization and direction of the incident light. The special characteristics of those gratings enable the realization of filter elements with a high optical performance and efficiency. New introduced gradient index grating structures, whose are combined with sub-wavelength high contrast gratings allowing for the realization of an asymmetric transmission behaviour by using a binary grating structure. Additionally the opportunity of a supplementary selectivity of the polarization state of the incident light is discussed. Further the possibilities of tuning and modifying of the transmission characteristics, such as transmission angle and width of the angular transmission range will be threatened. The three approaches are compared concerning their feasibility and compatibility of the fabrication processes and techniques.

Raman spectroscopy: variants and potentials

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