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Structural coloration metasurface

Color filters enable photosensors to obtain spectral composition of incoming radiation, be it to mimic human vision or to separate analytical signals. Efforts to increase the resolution of these photosensors lead to decrease in size of individual picture elements –pixels, which places increasing demands on the color filter technology. Conventional color filters operating on the principle of absorption of light in organic pigments are frequently used, but they are no longer meeting growing requirements of increasing sensor resolution. Within our research, we use nanostructures to separate light by wavelength and thus create structural coloration. We present a novel approach to separate colors which utilizes manipulation of radiation polarization using half-wave plate nanostructures and promises extremely small pixel size of only 300 nm. The presented color filter is first modeled and optimized through numerical simulations and then manufactured using nanofabrication methods. The designed metasurface could not however be fabricated. The optical response of substitute nanostructures of approximately similar dimensions is verified using optical spectroscopy in far field and shows successful color filtration despite exhibiting wide transmission peak.

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