All-polymer photonic crystal slab sensor - DTU Orbit (24/12/2018)

All-polymer photonic crystal slab sensor
An all-polymer photonic crystal slab sensor is presented, and shown to exhibit narrow resonant reflection with a FWHM of less than 1 nm and a sensitivity of 31 nm/RIU when sensing media with refractive indices around that of water. This results in a detection limit of 4.5x10^-6 RIU when measured in conjunction with a spectrometer of 12 pm/pixel resolution. The device is a two-layer structure, composed of a low refractive index polymer with a periodically modulated surface height, covered with a smooth upper-surface high refractive index inorganic-organic hybrid polymer modified with ZrO$_2$-based nanoparticles. Furthermore, it is fabricated using inexpensive vacuum-less techniques involving only UV nanoreplication and polymer spin-casting, and is thus well suited for single-use biological and refractive index sensing applications.

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