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【179】 Modelling, fabrication and characterization of low-density polyethylene based plasmonic waveguides for mid-IR photonic networks

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In this work we present the realization of low-density polyethylene (LDPE) ridge-waveguides using spinning-deposition, standard-lithography and oxygen-plasma-etching for patterning. Parameters such as toluene-solvent concentration, spinning-speed and bake-out-process temperature in a vacuum-oven are optimized in order to obtain the required film-thickness. Ellipsometry data shows a LDPE-thickness of ~ 400 - 500 nm, corresponding to refractive index of 1.51 (at 630 nm). The results indicate that spin-coating with bake-out at 100°C yields the best-quality LDPE-films. Additional COMSOL-simulations display low optical losses of LDPE for the whole mid-IR spectral range. As proof-of-concept we will also present the results of optical characterization performed in the log-wave infrared to confirm the suitability of LDPE for mid-IR plasmonic-applications.

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