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Influence of the dielectric environment on periodic hole arrays DIMITRIOS KOUKIS, DANIEL J. ARENAS, SINAN SELCUK, DAVID B. TANNER, ARTHUR F. HEBARD, SERGEI V. SHABANOV — The influence of various dielectric environments, surrounding periodic hole arrays in optically thick metal films, was studied experimentally. The transmittance (T) and reflectance (R) at nearly normal incidence, were measured using a microscope photometer in the near infrared region and Bruker IFS 113v in the mid-infrared region. The metal films are fabricated on substrates with different refractive indices for the two spectral ranges. The refractive index of the material on the other side, can be either that of air or of another dielectric. For large differences in refractive index, between the two sides, the spectra contains separate resonances. These resonances shift in frequency as the refractive indices match better and coincide with the existing ones in the case of good match, enhancing them in amplitude and linewidth. The experimental results are compared to theoretical predictions.

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