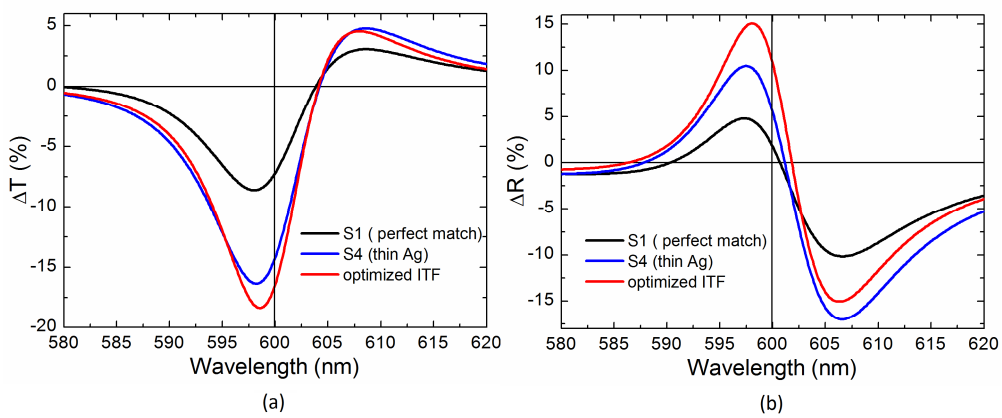

Fig. 10. Changes in transmittance and absorbance for an optimized double-sided ITF structure compared to structures 1 and 4 due to a 50 J/m^2 pump pulse.

6. Conclusion

We have investigated, by experiment and simulation, the NLO properties of ITFs. We demonstrated the amplification of the NLO response of an ITF by a factor of 30 over an isolated Ag film using white-light continuum pump-probe measurements. Through simulation, we also explored the effects of variations in design parameters, specifically the thickness of the Ag film and the relative reflectances of the dielectric structure and the Ag film, on the magnitude of the NLO response of the ITF. We found that the NLO response can be broken down into three contributions (namely nonlinear absorption, nonlinear reflection, and a nonlinear phase shift), and that over-matched structures exploit these contributions the best to produce the greatest change in nonlinear transmittance. Also, thinner Ag films lead to stronger changes of the NLO response. Although the changes in transmittance shown here are relatively small, the enhancement of the NLO response provided by such structures could be very attractive for the nonlinear control of laser fluence if metals with a stronger NLO response than Ag, such as Au, are used instead.

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