comparison between single-arm and two-arm gap antennas shows that the growing distance between adjacent arms decreases the coupling strength and therefore reduces the overall red-shift.

In addition to these numerical results, we have experimentally shown that a strictly inert fabrication together with an encapsulation can prevent aluminum optical antennas from degradation. There is a clear qualitative trend toward a stable peak resonance for the encapsulated sample, whereas the sample stored at ambient conditions shows a spectral shift over time.

Appendix: Dielectric constant of ITO and dark-field spectra

In Fig. 8 we show the dielectric function of ITO used for the FDTD simulations. The dark-field spectra from the encapsulated and non-encapsulated samples are depicted in Fig. 9.

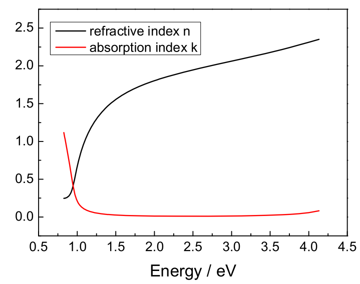

Fig. 8. Refractive index n and absorption index k for ITO as measured by ellipsometry.

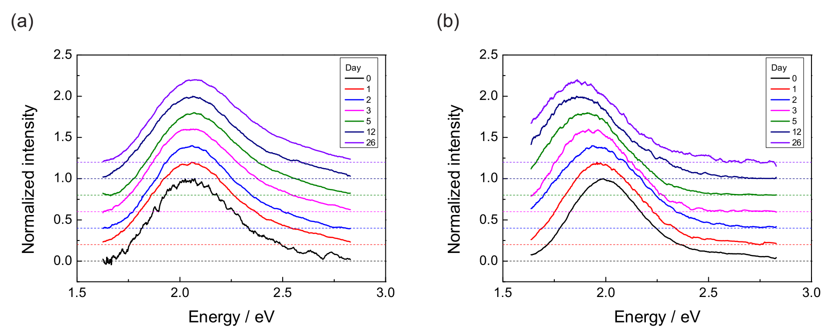

Fig. 9. Dark-field spectra of (a) an encapsulated (b) and a non-encapsulated aluminum two-arm gap antenna with a nominal arm length of 100 nm. All spectra have been normalized to unity and an offset of 0.2 has been introduced between individual spectra to facilitate discrimination. The horizontal dashed lines are guides to the eye. The standard deviation for the encapsulated sample is below 2.8 nm, which is in good accordance with the measurement uncertainty. Different signal-to-noise ratios arise from slight differences in the alignment between condenser and sample during individual measurements.

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