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**Label-free and real-time imaging of microscale mixture concentration fields using Surface Plasmon Resonance (SPR) reflectance** KENNETH KIHM, ILTAI KIM, University of Tennessee — A label-free visualization technique is presented based on surface plasmon resonance (SPR) reflectance sensing. The developed SPR imaging system is applied for the nonintrusive and real-time mapping of microscale mixture concentration fields. The key idea is that the SPR reflectance sensitively varies with the refractive index of the near-wall region of the test field contacting the thin metal (Au) layer. The Fresnel equation, based on Kretschmann's theory, correlates the SPR reflectance with the refractive index of the test medium and with the mixture concentration. An example application is presented for the case of ethanol penetrating into water contained in a micro-channel with a rectangular cross-section of 91-micrometer wide and 50-micrometer high. The measurement sensitivity, uncertainties and detection limitations of the implemented SPR imaging sensor are carefully examined for its potential as a nonintrusive means of microscale concentration field mapping.

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