

Supplementary information to: In liquid infrared scattering scanning near-field optical
microscopy for chemical and biological nano-imaging

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Simulations of the field

While thin <5 nm films of gold can boost the local electric fields appreciably (Fig. S1a), the field strength drops off rapidly with increasing film thickness. At 50 nm Au thickness, weak fields are present (Fig. S1b). However, nonuniform films can create strong local fields. When the tip is at the edge of a film >1e3 intensity enhancement is present (Fig. S1c). The field enhancement drops off as the tip moves from the edge (Fig. S1d).

As observed in Fig. 4 in the main text, a Au layer can also sharpen optical field spatial extent and improve spatial resolution. Fig. S2 shows the field spatial extent of the optical field in the region between a Au tip and (i) a ZnSe surface (blue) and (ii) a ZnSe surface with a 50 nm thick Au layer. The electric field is approximately 50% more confined in the latter case, which can result in improved spatio-spectral spatial resolution.

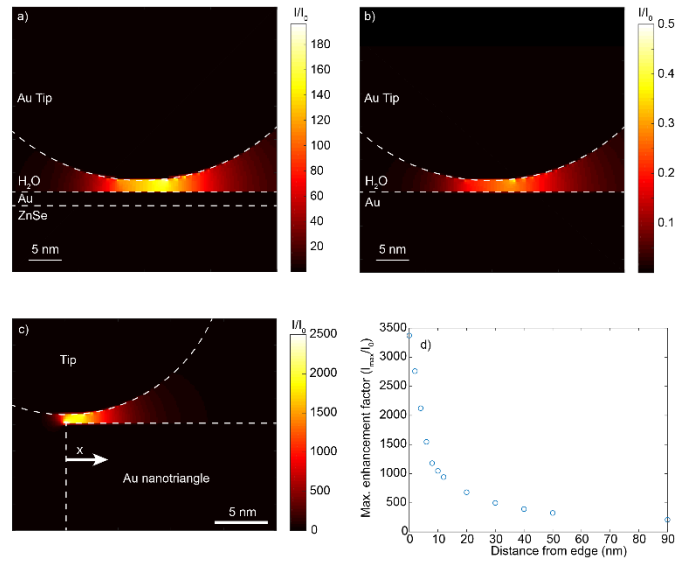


Fig. S1a) Field distributions between a Au coated tip and uniform a) 2 nm and b) 50 nm thick Au films. While the 2 nm thick film increases field strength appreciably, a weak local field is present for the 50 nm thick film. c) Simulations of the field distribution between a Au tip and a 50 nm high Au step edge under total internal reflection illumination demonstrate a factor of $>10^3$ intensity enhancement. d) The field enhancement decays as the tip moves away from the Au edge.

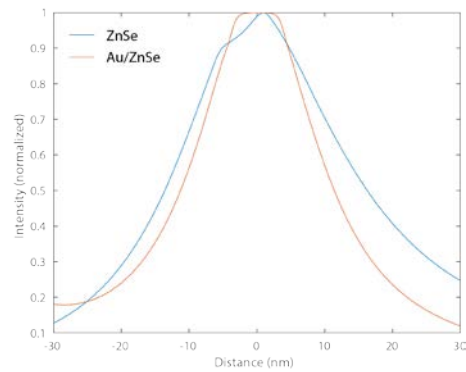


Fig. S2. Spatial extent of the electric field between a Au tip and the ZnSe surface (blue) and a 50 nm thick gold layer on the ZnSe surface (red).