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Surface Plasmon Rainbow Jets ALEXANDRE BOUHELIER, GARY WIEDERRECHT, Argonne National Laboratory, Center for Nanoscale Materials and Chemistry Division, Argonne, IL 60439 — A new method for optically exciting and visualizing surface plasmons in thin metal films is described. The technique relies on the use of a high numerical aperture objective lens to locally launch surface plasmons with an area much smaller than their lateral decay length. We visualize directly the intensity distribution of the surface plasmons by detecting the intrinsic lossy modes associated with plasmon propagation in thin films. Our approach allowed us to excite simultaneously a broad spectral continuum of surface waves and to describe for the first time surface plasmon rainbow jets. We quantified the attenuation of the jet as a function of wavelength and film thickness and compared it to the different propagation damping mechanisms. We demonstrated the influence of the interface on the surface plasmon propagation length and demonstrated surface plasmon spectral filtering using molecular excitonic adsorbates. We will discuss the potential of the technique to pump-probe, plasmon-based interface spectroscopy.

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