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High Efficiency Surface Plasmon Enhanced Near-field Scanning Optical Microscope Probe Development. R.E. HOLLINGSWORTH, G.J. NUEBEL, ITN Energy Systems Inc, I.C. SCHICK, P.D. FLAMMER, J.T. MARTINEAU, M.A. HUROWITZ, R.T. COLLINS, Colorado School of Mines — We present results from the development of novel, high throughput, near-field scanning optical microscope (NSOM) probes based on excitation of surface plasmons. The probe consists of an opaque noble metal film with a bullseye grating cavity on the input surface, and a sharp metal post on the output surface. The post is centered inside the inner grating ring and surrounded by a sub-wavelength ring aperture. The grating structure couples incident photons into surface plasmon waves. The transmission efficiency is enhanced for wavelengths where the plasmon is resonant with the cavity. Topographic and optical resolutions are determined by the sharpness of the metal post. This design is anticipated to provide the high spatial resolution of an apertureless NSOM combined with the experimental convenience of an aperture NSOM. Experimental and computational results from test structures will be presented. This material is based on work supported by the National Science Foundation under Grant No. DMI-0522281.

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