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Coherence and polarization properties of individual antenna-like metal nanowires LEVENTE KLEIN, HENDRIK HAMANN, IBM TJ Watson Center, YAT-YIN AU, SNORRI INGVARSSON, Science Institute, University of Iceland — We investigate the coherence and polarization properties of thermal radiation from resistively heated individual metal nanowires. The high aspect ratio nanowires are fabricated by e-beam lithography with widths from 60 nm up to 2 um, dimensions well below the wavelength of the emitted thermal radiation. The thermal radiation from the metal nanowires has a spatial orientation perpendicular to the substrate with a radiation patterns similar to an electric dipole radiation. Furthermore, the emitted thermal radiation becomes highly polarized as the width of the nanowires decreases. For very narrow nanowires the polarization is oriented along the long axis of the nanowires while its orientation becomes perpendicular to the long axis for widths above 1 um. While in the far field the thermal radiation is incoherent, in the near field the emitted thermal radiation becomes coherent and interference fringes are observed as a mirror approaches the nanowire at gaps smaller than 20 um. The interference fringes are generated by the thermal radiation from the nanowire and its image in the mirror with an increased fringe visibility for narrower nanowires. A lower bound for the coherence length for thermal radiation is 30 um for very narrow metal nanowires.

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