Abstract Submitted
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Partially-metal–coated Tips for Near-field Nanospectroscopy.[1] YUJIA ZHANG, XINZHONG CHEN, DEREK CHEN, ZIHENG YAO, SUHENG XU, Department of Physics and Astronomy, Stony Brook University, Stony Brook, New York 11794, USA, PATRICK MCARDLE, M. MUMTAZ QAZILBASH, Department of Physics, College of William Mary, Williamsburg, VA 23187-8795, USA, MENGKUN LIU, Department of Physics and Astronomy, Stony Brook University, Stony Brook, New York 11794, USA, DEPARTMENT OF PHYSICS AND ASTRONOMY, STONY BROOK UNIVERSITY, STONY BROOK, NEW YORK 11794, USA TEAM, DEPARTMENT OF PHYSICS, COLLEGE OF WILLIAM MARY, WILLIAMSBURG, VA 23187-8795, USA COLLABORATION — Here, we test the possibility of a generic design scheme for wavelength-selective tip enhancement via finite-element numerical modeling. We employ a Si-based tip with various gold coating lengths on the top, yielding a tunable near-field field strength at the tip apex. Calculations show a wavelength-dependent enhancement factor of the metal-coated tip due to the geometrical antenna resonances, which can be precisely tuned throughout a broad spectral range from visible to terahertz frequencies by adjusting the length of the metal coating. By changing the coating pattern into a chiral helical structure on an achiral tip, we also demonstrate the importance of coating-length effect in designing high-performance enantiomeric near-field scanning. Our methods and findings offer interesting perspectives for developing near-field optical probes, pushing the detection and resolution limits of tip-enhanced near-field detections and nanospectroscopies.

[1]Partially-metalcoated Tips for Near-field Nanospectroscopy

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