Electronic Supplementary Material (ESI) for Nanoscale.

Supporting Information:

Generation of Magnetoelectric Photocurrents using Toroidal Resonances: A New Class of Near-Infrared Plasmonic Photodetectors

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S1. Reflection spectra

S2. Magnetic field intensity

S3. Characteristic current-voltage profile

S4. Dark current

S5. Operation speed

1. Reflection spectra

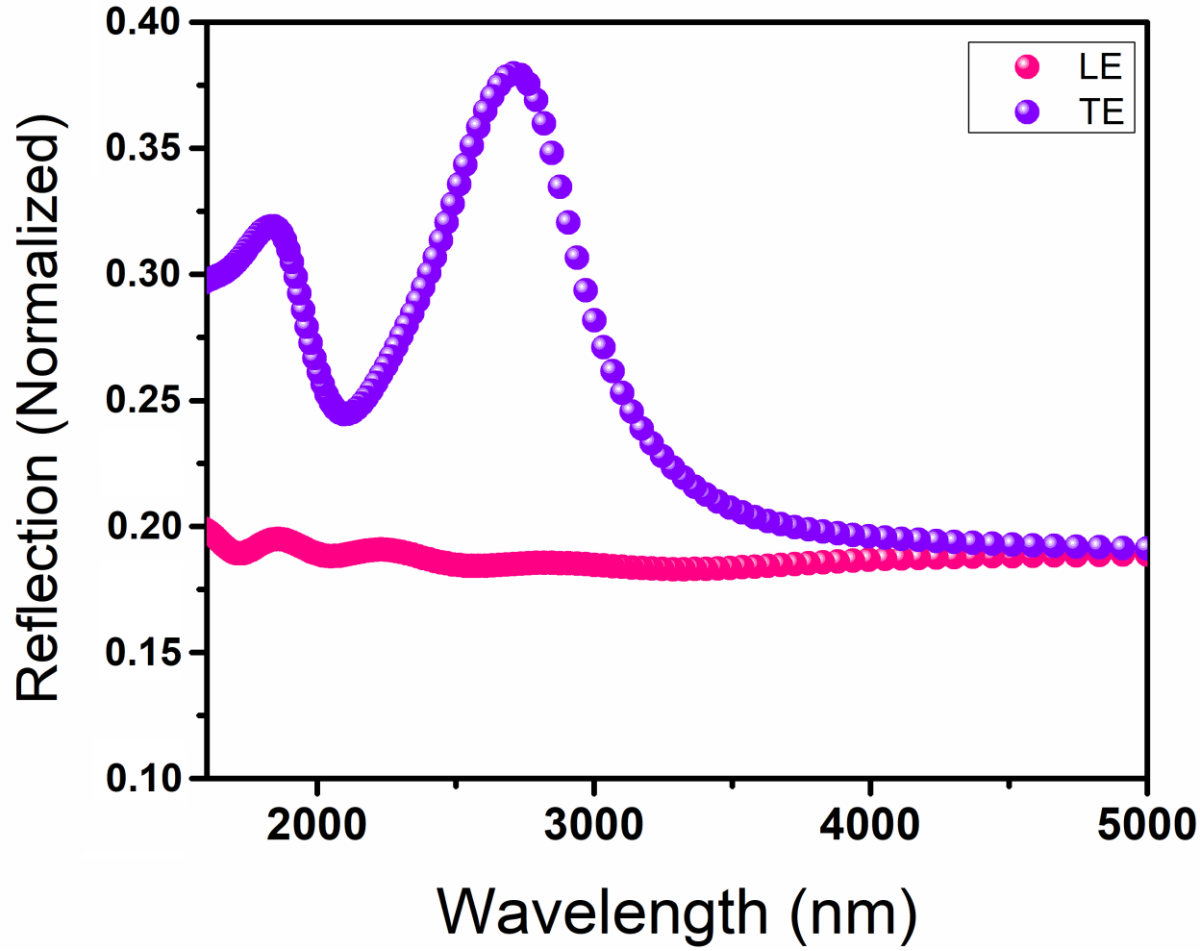

Figure S1. Reflection spectra for the toroidal plasmonic unit cell under transvers (TE) and longitudinal (LE) polarization excitation.

2. Magnetic-field intensity

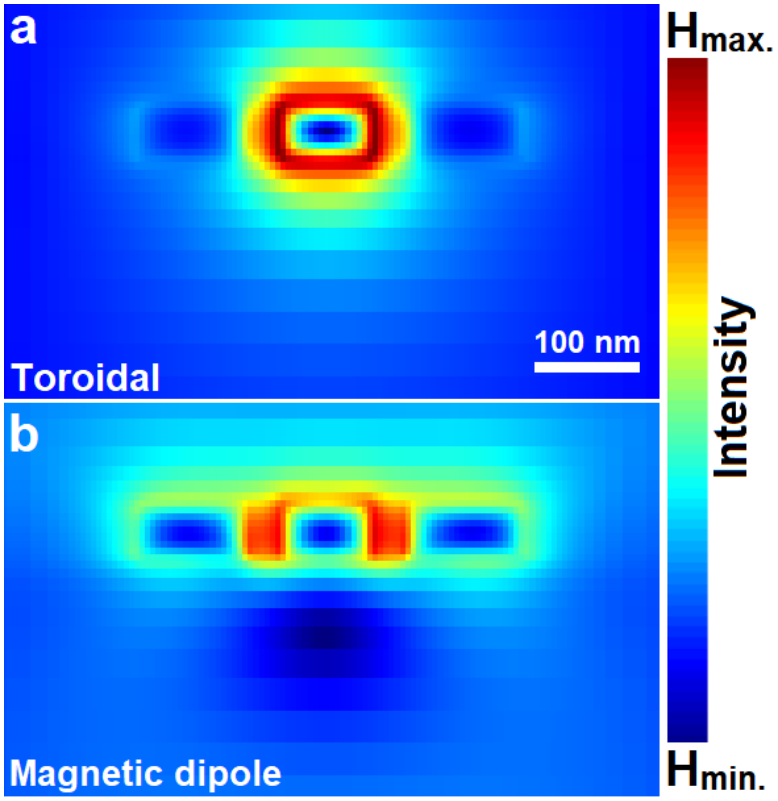

Figure S2. Cross-sectional full-field electromagnetic simulation of the magnetic field (H-field) intensity across the plasmonic meta-atom at (a) toroidal (2850 nm) and (b) magnetic (2150 nm) dipoles resonances.

3. Characteristic current-voltage profile

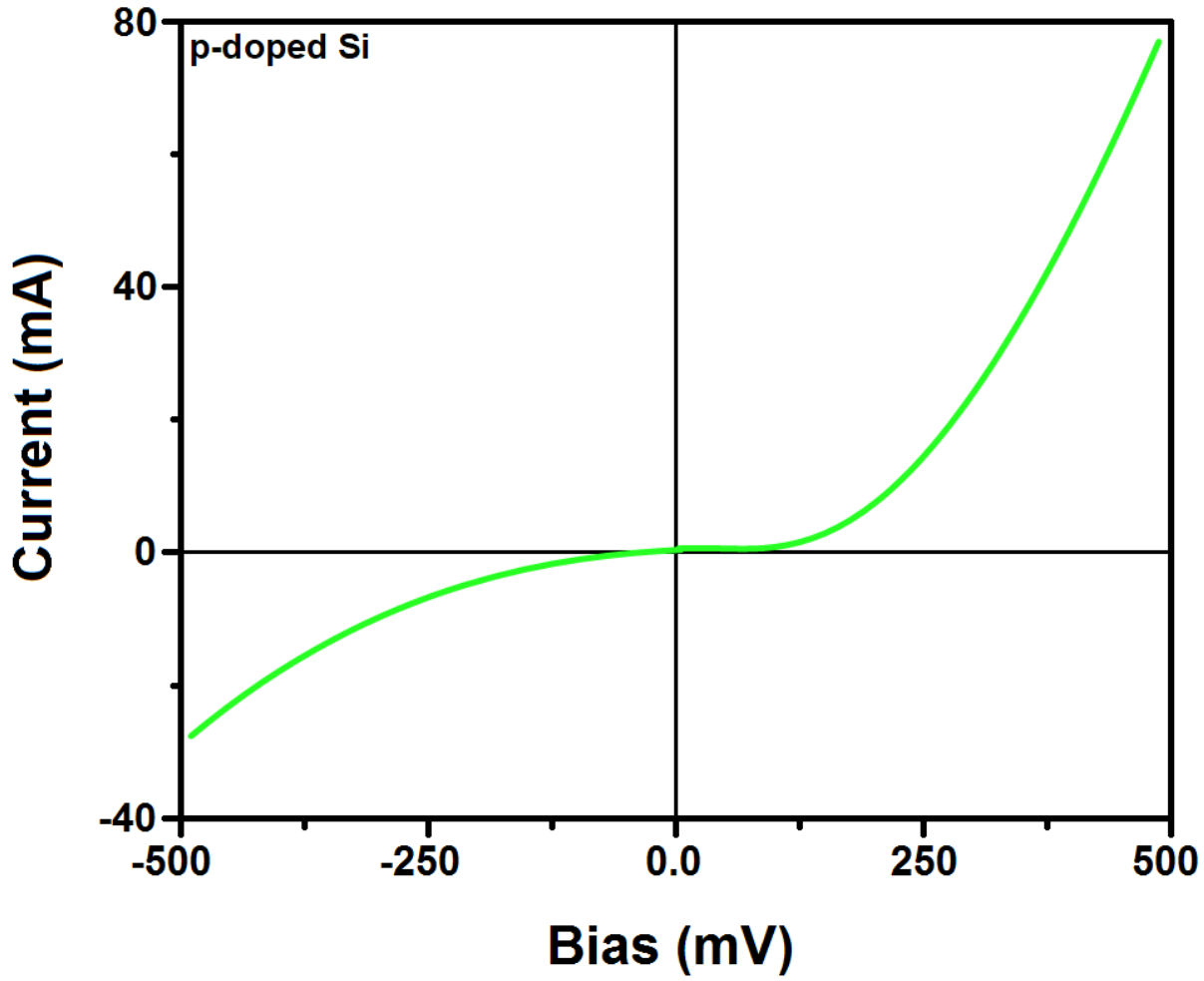

Figure S3. Characteristic current-voltage curve for the p-type Si-mediated plasmonic photodetector device at the toroidal dipole wavelength.

4. Dark-current

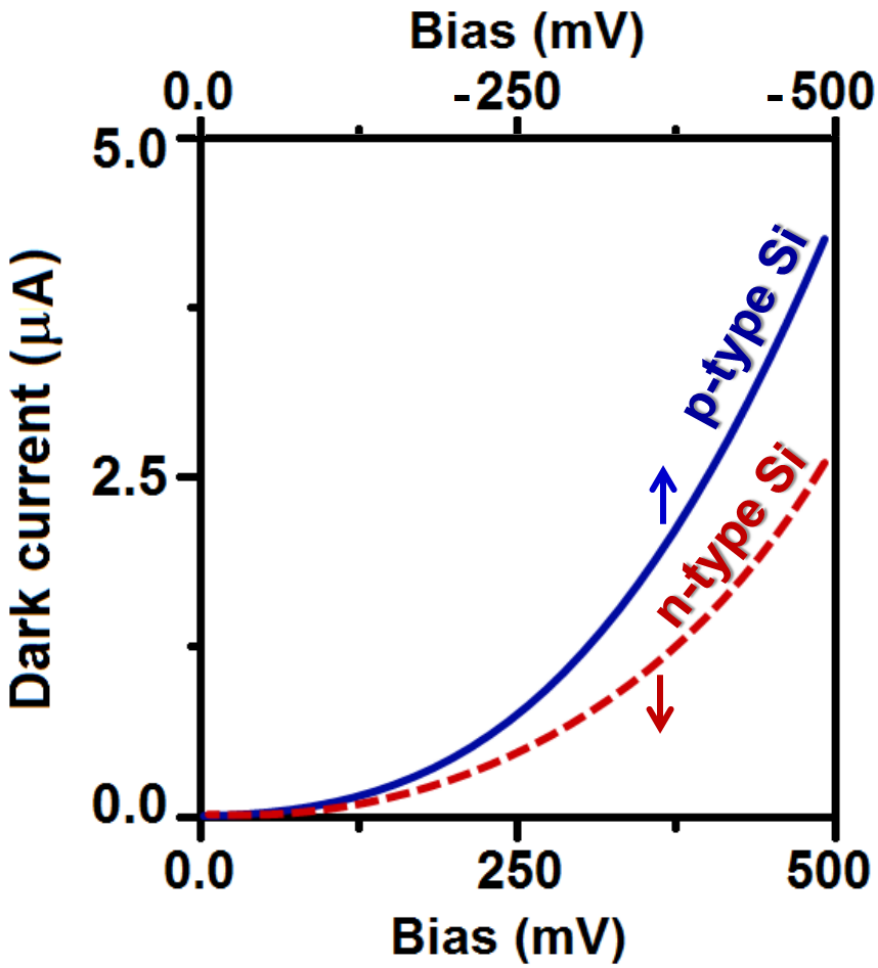

Figure S4. *I-V* curves of the toroidal plasmonic photodetector in dark for both n- and p-type Si substrates.

5. Operation speed

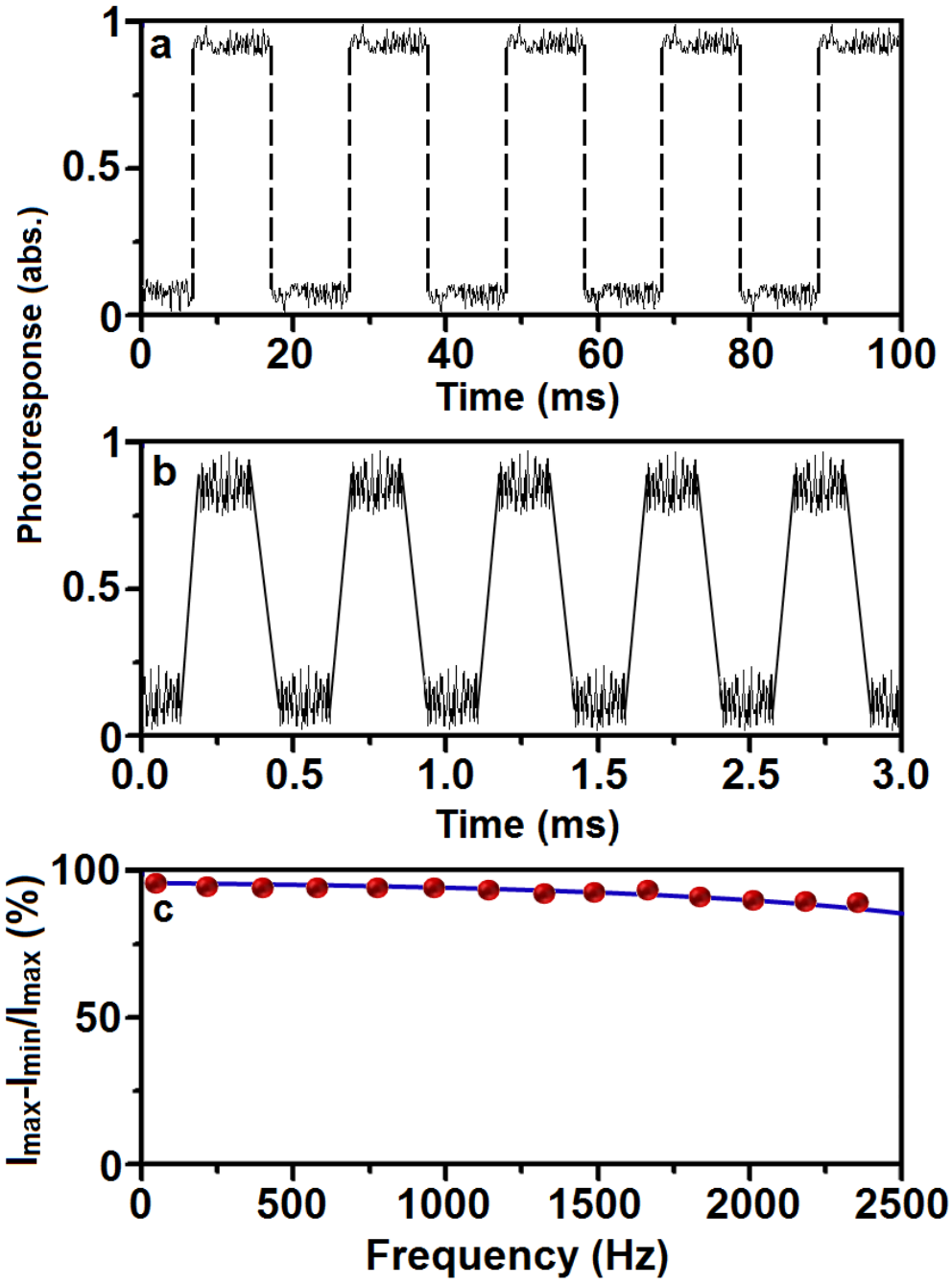

Figure S5. Normalized photoresponse of the toroidal plasmonic photodetector to the incident infrared beam at a frequency of a) 100 Hz, and b) 2000 Hz. c) The relative balance as a function of switching frequency of the optical chopper.