Supplementary Information (SI) for

Active tuning of Mie resonances to realize sensitive photothermal measurement of single nanoparticles

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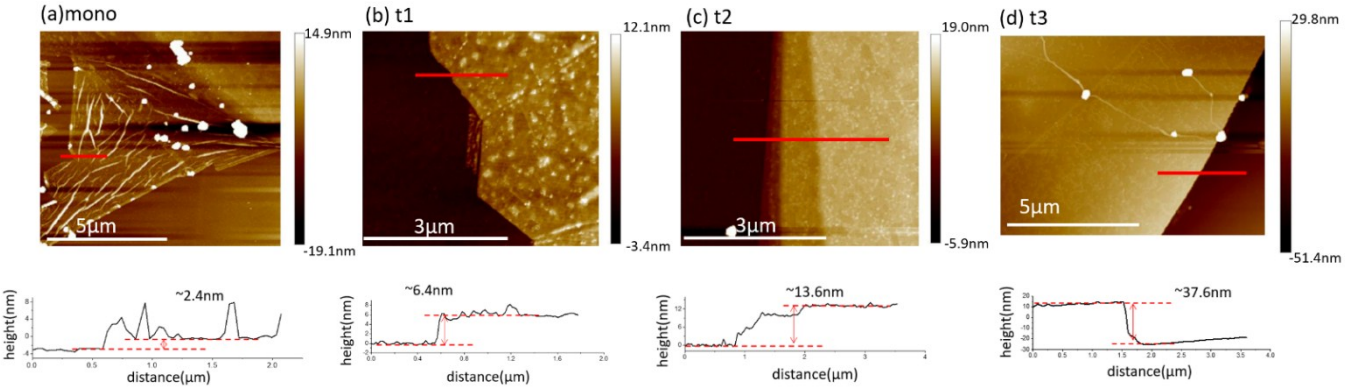

Figure S1. (a-d) AFM images and the line scan of WS_2 flakes named by "mono", "t1", "t2" and "t3". The thickness of monolayer WS_2 we measured cannot match the actual thickness (0.8 nm) because of the rough VO_2 film substrate.

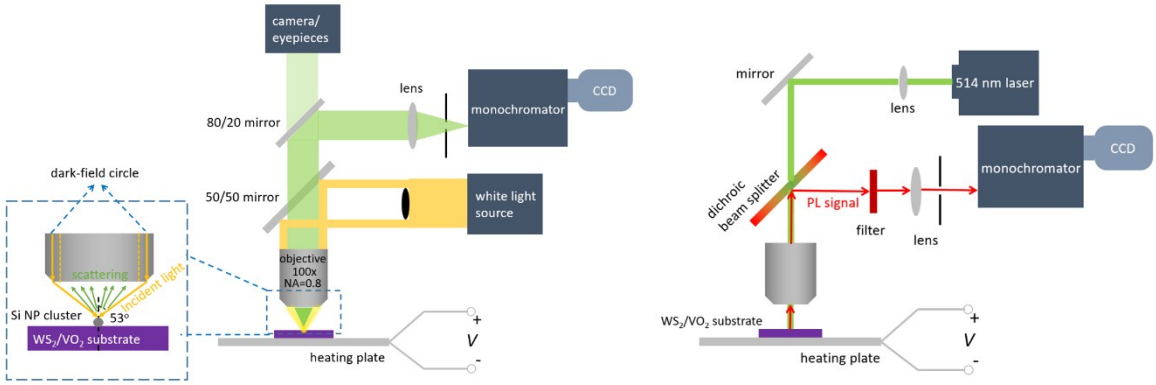

Figure S2. Left: Optical setup for dark-field scattering measurement. Inset is the schematic showing the dark-field objective with 53° oblique incidence. Right: Optical setup for PL measurement.

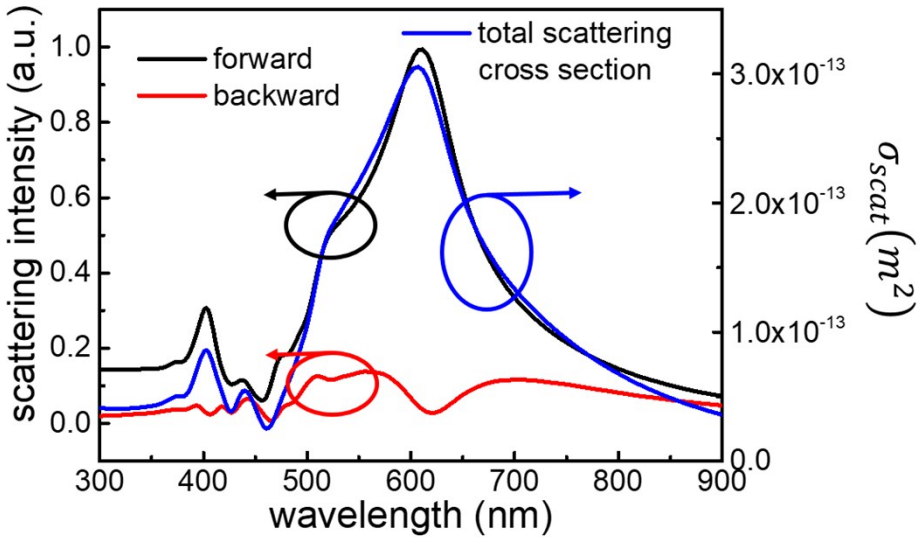

Figure S3. Simulated total scattering cross section of a Si NP dimer with diameters of 150 nm, and simulated backward and forward scattering spectra with arbitrary unit after uniform scaling.

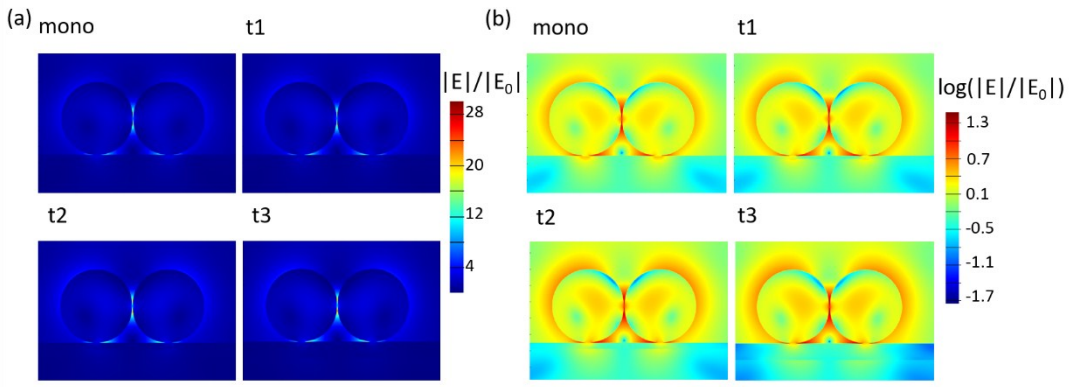

Figure S4. (a,b) Simulated electric field profiles of a typical Si NP dimer with the diameter of 180 nm on WS_2 with four different thicknesses at $\lambda = 625nm$, the excitonic wavelength of WS_2. The field profiles (a) are converted into logarithmic scale in (b).

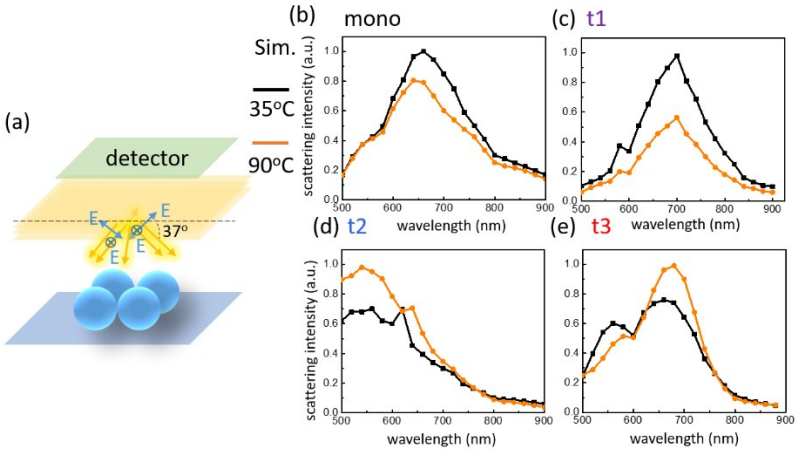

Figure S5. (a) The oblique incident model used in FDTD simulation. Yellow planes represent a series of plane wave incidence, yellow arrows mean the incident directions, and blue arrows indicate the polarization directions. (b-e) Simulated scattering spectra of the measured Si NP clusters on mono-, t1-, t2- and t3-WS_2. Black curves mean the spectra were measured at 35 °C under the insulator phase of VO_2, while orange curves mean the spectra were measured at 90 °C under the metallic phase of VO_2.

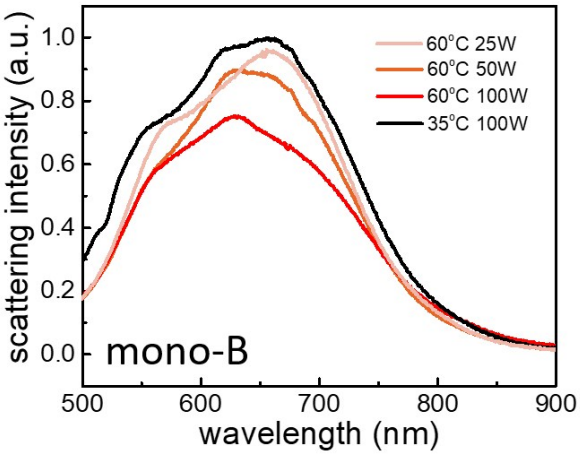

Figure S6. Scattering spectra of the "mono-B" Si NP cluster under 100 W white light incidence at 60 °C and 35 °C, and the light power dependent (50 W & 25 W) scattering spectra at 60 °C.

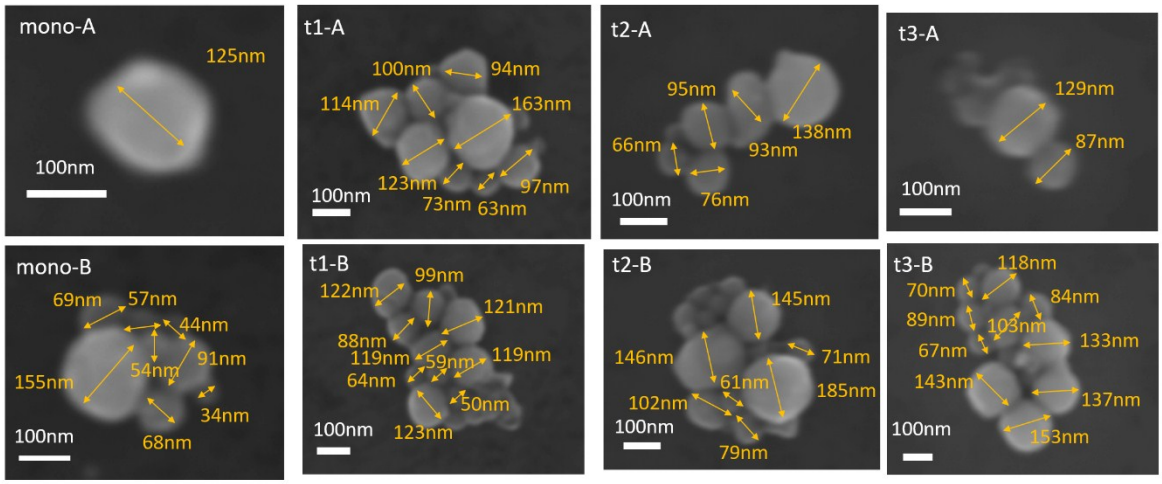

Figure S7. High magnification SEM images of all the measured Si NPs. Yellow arrows showing the diameters of Si NPs.

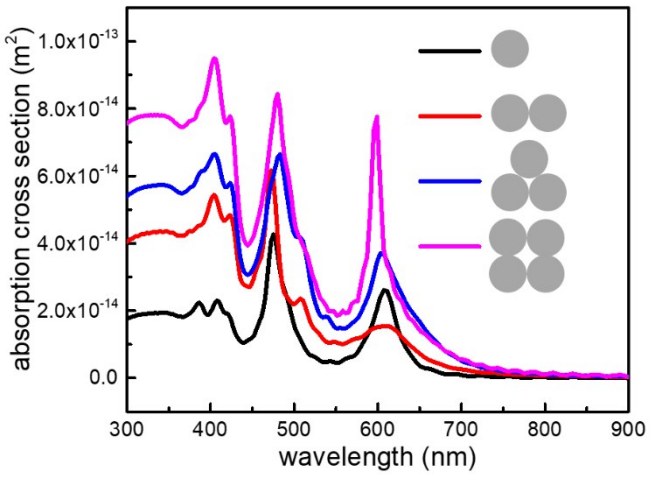

Figure S8. Simulated absorption cross sections (σ_{scat}) of Si NPs (75 nm radius) with four typical aggregation states: single, dimer, trimer and tetramer.

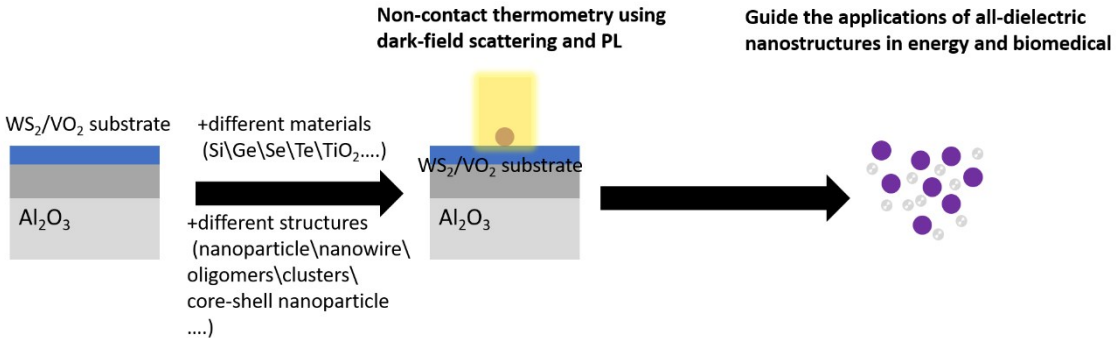

Figure S9. Illustration of the application range and meaning of the WS_2/VO_2 testing platform.