Supplementary Information

In situ High Throughput Scattering Light Analysis of Single Plasmonic Nanoparticles in Living Cells

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1. Characterization of GNPs

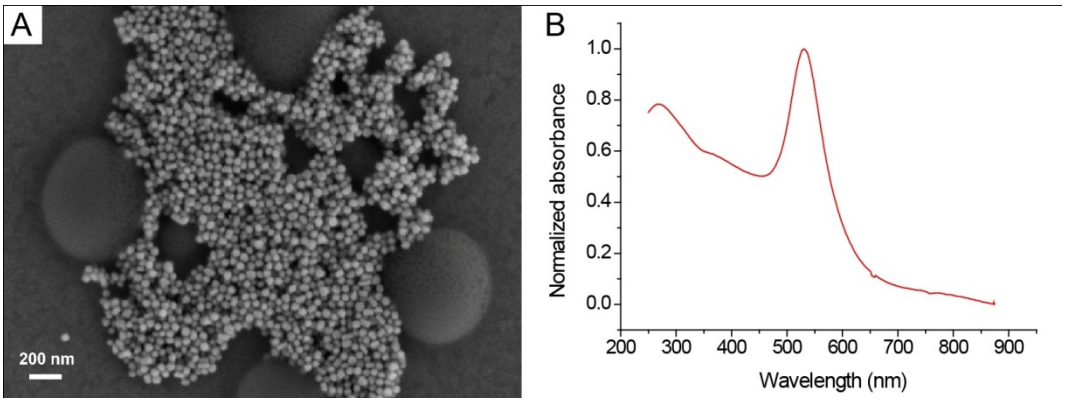

Figure S1 (A) SEM image of GNPs. (B) UV-*vis* spectrum of the GNP sample.

2. Recognizing GNPs through presented method

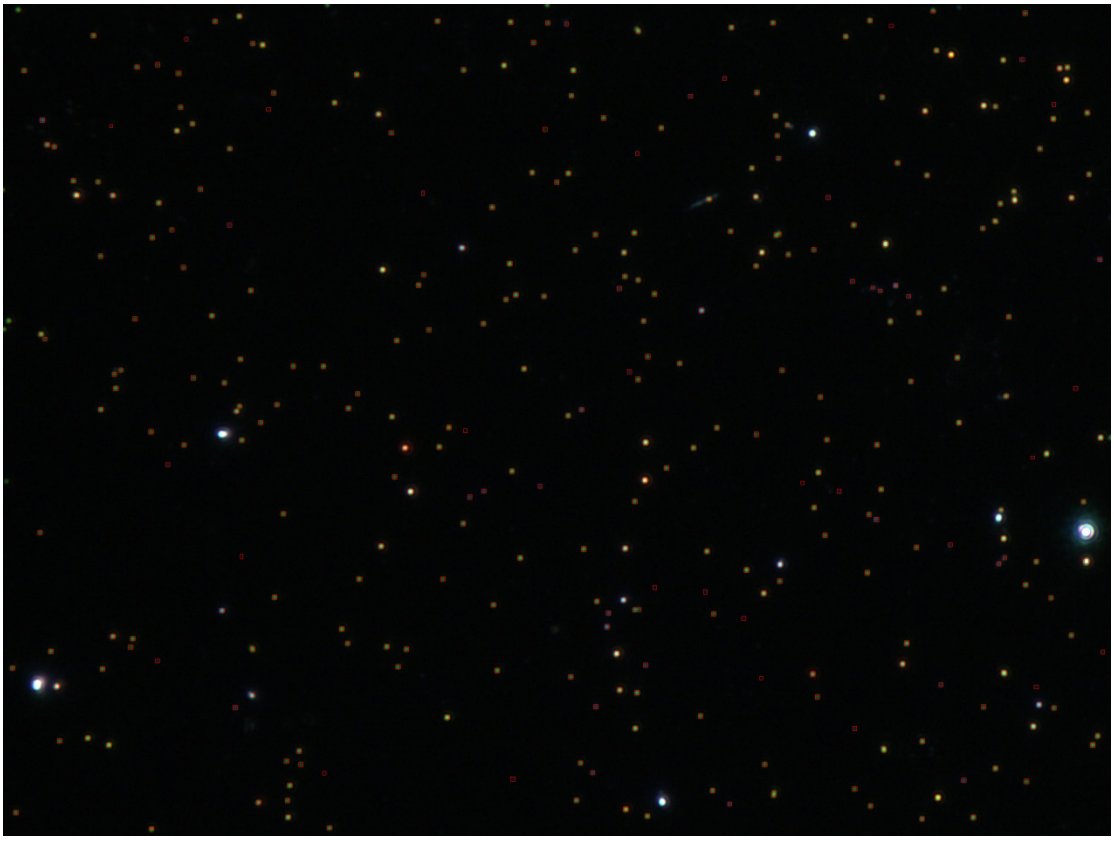

Figure S2 Detection result of DFM image of GNPs immersed in water on glass slide. Scattering spots are marked by red rectangle

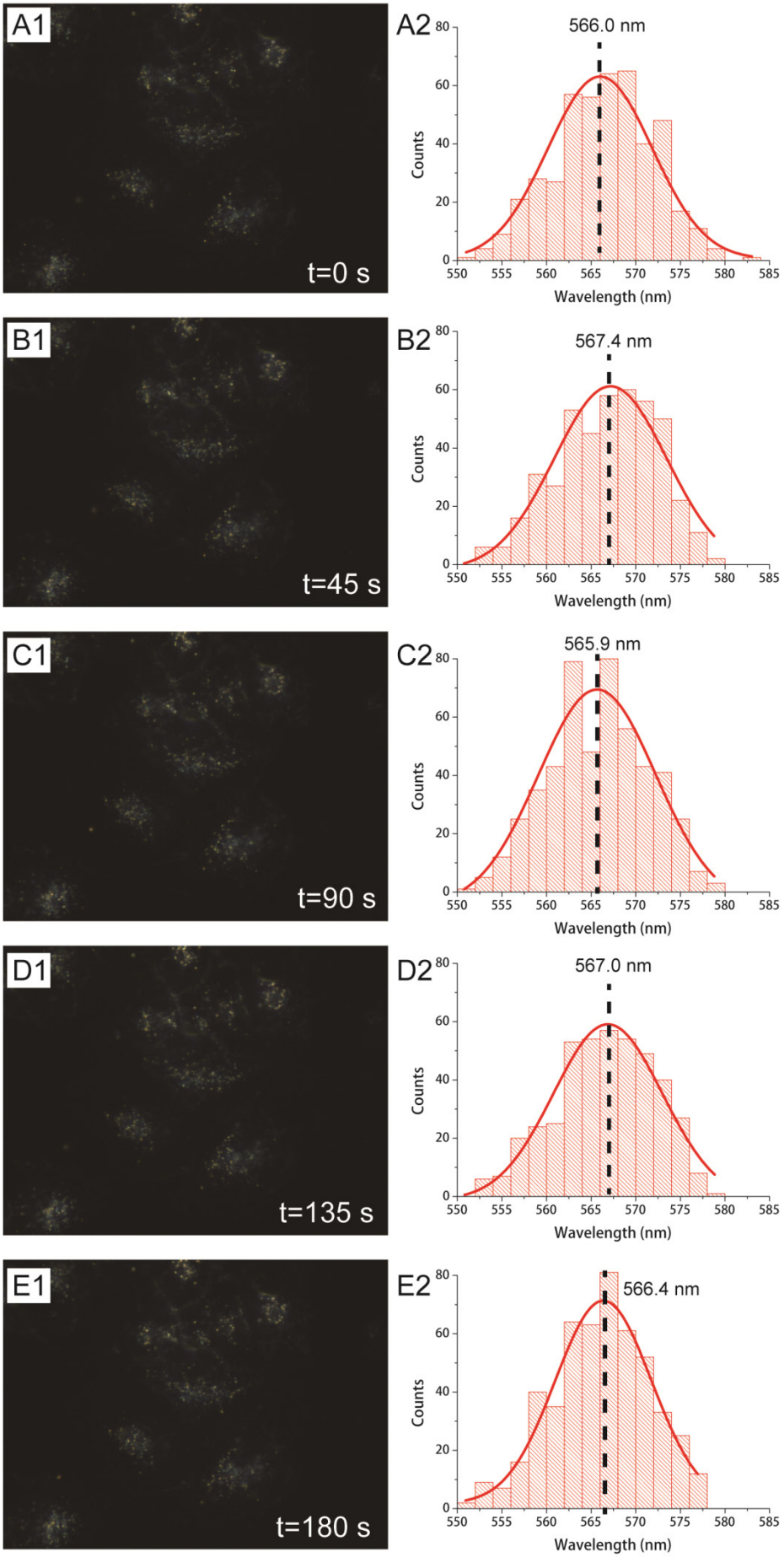
A1
t=0 s
A2
566.0 nm
B1
t=45 s
B2
567.4 nm
C1
t=90 s
C2
565.9 nm
D1
t=135 s
D2
567.0 nm
E1
t=180 s
E2
566.4 nm
Counts
Wavelength (nm)
0
20
40
60
80
550
555
560
565
570
575
580
585

Figure S3 A1 to E1: Living cell images recorded at an interval of 45 s after 24 h incubation with GNPs (without treatment of copper ions). The movement of GNPs in the cells could be observed in the images, but not obvious. The scattering light of GNPs could fluctuate due to their sensitivity to environment; A2 to E2: Histograms of the GNPs' peak wavelengths fitted by Gauss function (red curve), and the centers of the distribution are labeled by black dashed line. Obviously, the distribution fluctuated during the total 180 s recording because of the complex environments. However, the centers of the histograms calculated by fitting into a Gauss function was almost unchanged since the sizes and chemical components of the GNPs remain the same. This result is reasonable, since no copper ion was treated.

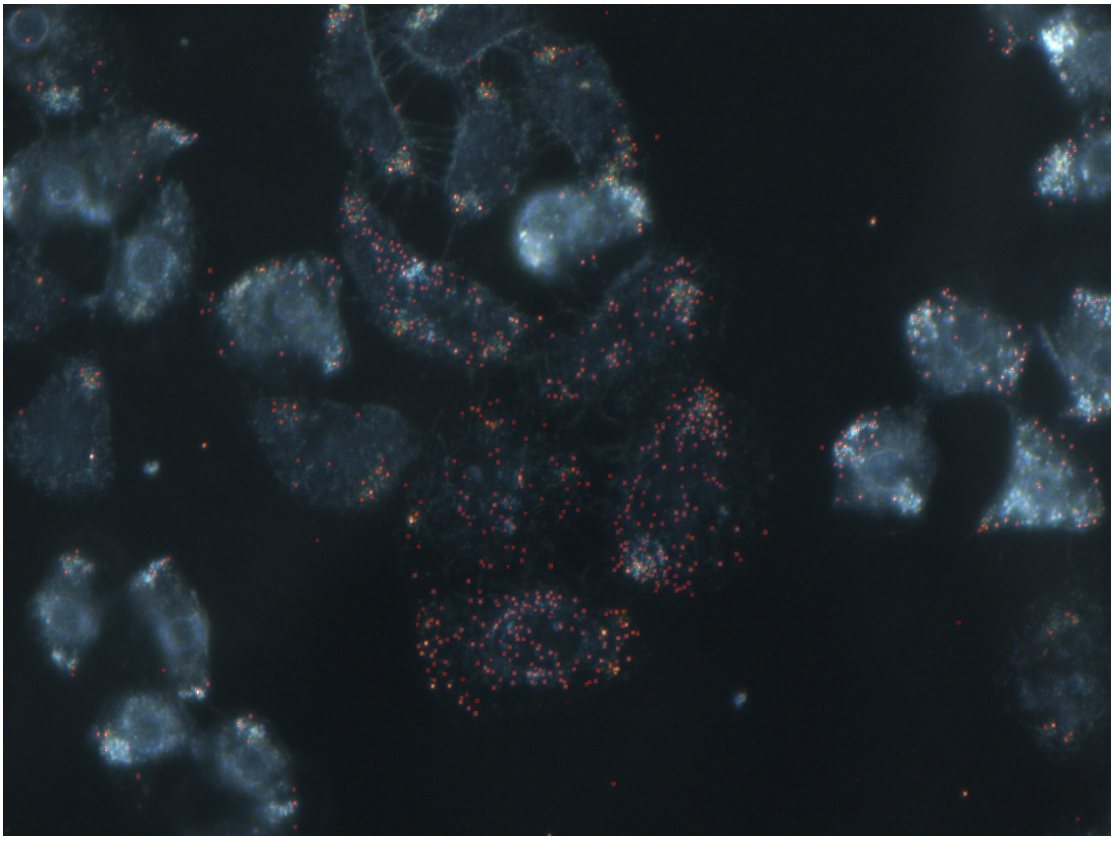

Figure S4 Detection result of DFM images of GNPs in HeLa cells which have been treated with taxol. Scattering spots are marked by red rectangle.

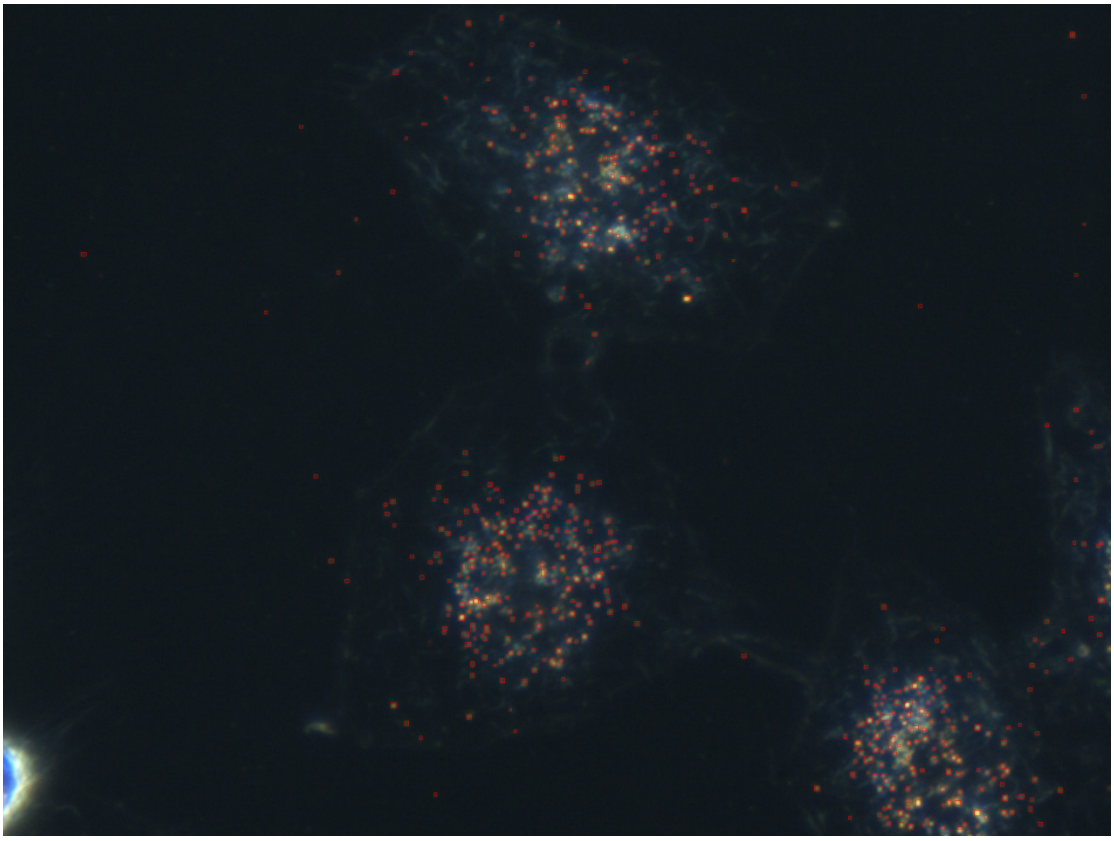

Figure S5 Detection result of DFM images of GNPs in HeLa cells without treatment of the taxol. Scattering spots are marked by red rectangle.

3. Rough comparison of presented method with conventional method on analysis speed

For the conventional spectrograph, it could only acquire a few scattering spectra of GNPs at a time. The processing of acquiring the spectra of a single GNP contains operating the platform, focusing and run with the spectrograph. For a manual-assisted platform, this process may cost at least 1 min. Using an automatic platform, the acquisition time could be reduced to several seconds. Assuming 10 particles were acquired at a time by the spectrograph, and the automatic platform need 5 s to acquire the spectrum. Then, the total time for acquiring 1000 particles is approximate 8.3 h. The throughput of our method mainly depends on the acquisition and image processing speed. For a common digital camera, it will cost 10-1000 ms to obtain an image. The analysis of the image by our method costs about 5-20 s for 1000 particles by a general laptop. Therefore, our method will cost no longer than half a minute to obtain the large information of single GNPs.