

Supplementary materials

for

Fast and slow laser-stimulated degradation of Mn-doped $\text{Li}_4\text{Ti}_5\text{O}_{12}$

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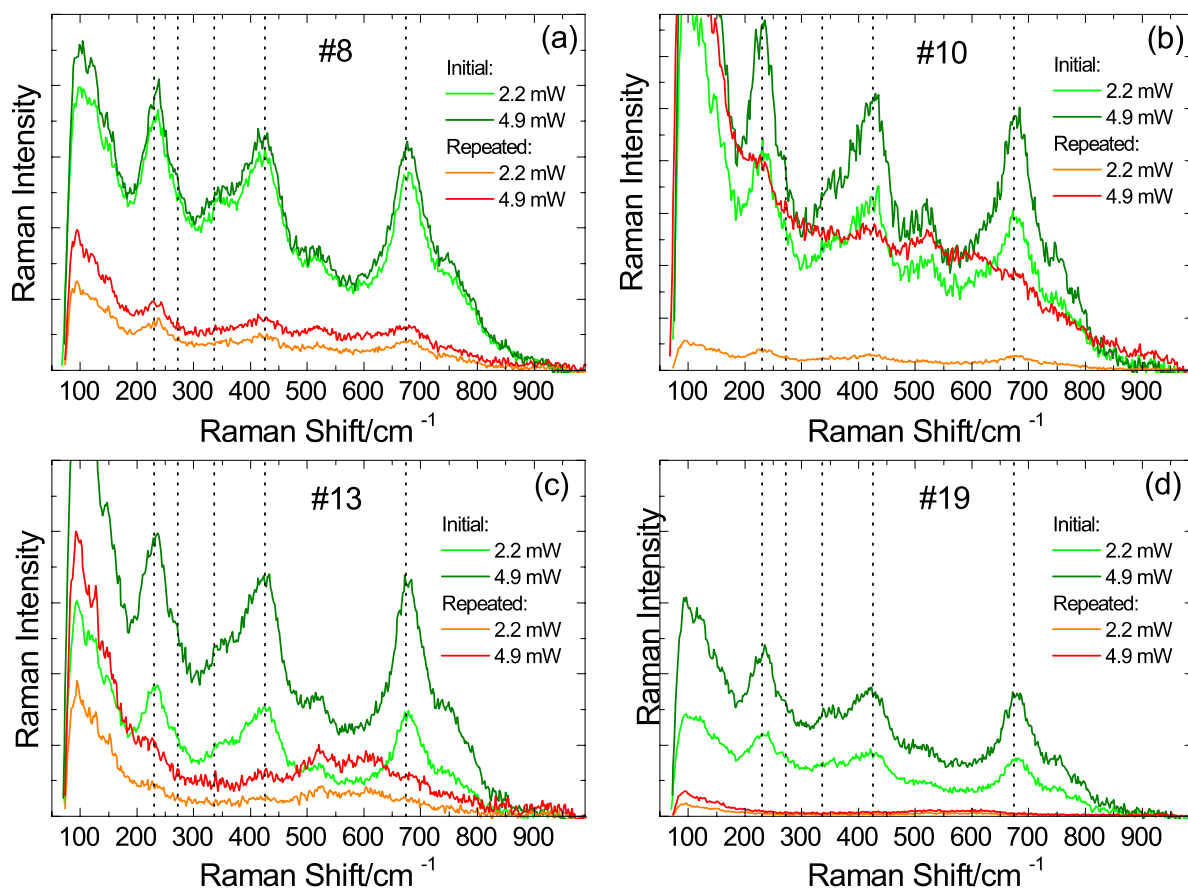


Figure S1. Raman spectra measured at two-month intervals for (a) "stable" particle #8, and (b) particle #10, degraded during repeated measurement, and particles (c) #13 and (d) #19, degraded between initial and repeated measurements. The dotted lines indicate the positions of the main characteristic LTO bands.

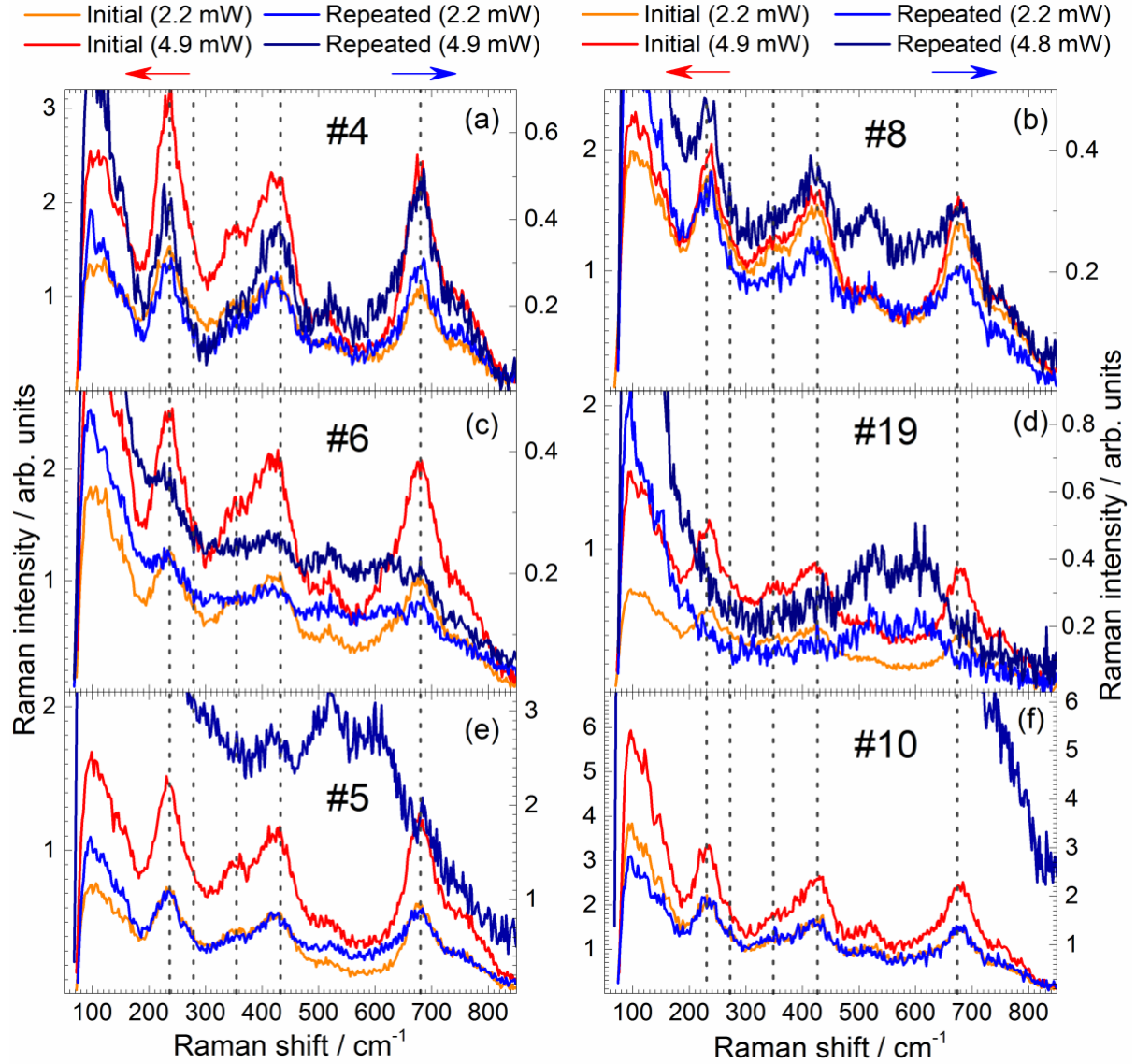


Figure S2. Rescaled Raman spectra measured at two-month intervals for "stable" particles (a) #4 and (b) #8, particles (c) #6 and (d) #19, degraded between initial and repeated measurements, and particles (e) #5 and (f) #10, degraded during repeated measurement. The left Y-axes correspond to the initial measurements, while the right Y-axes correspond to the repeated measurements. The dotted lines indicate the positions of the main characteristic LTO bands.

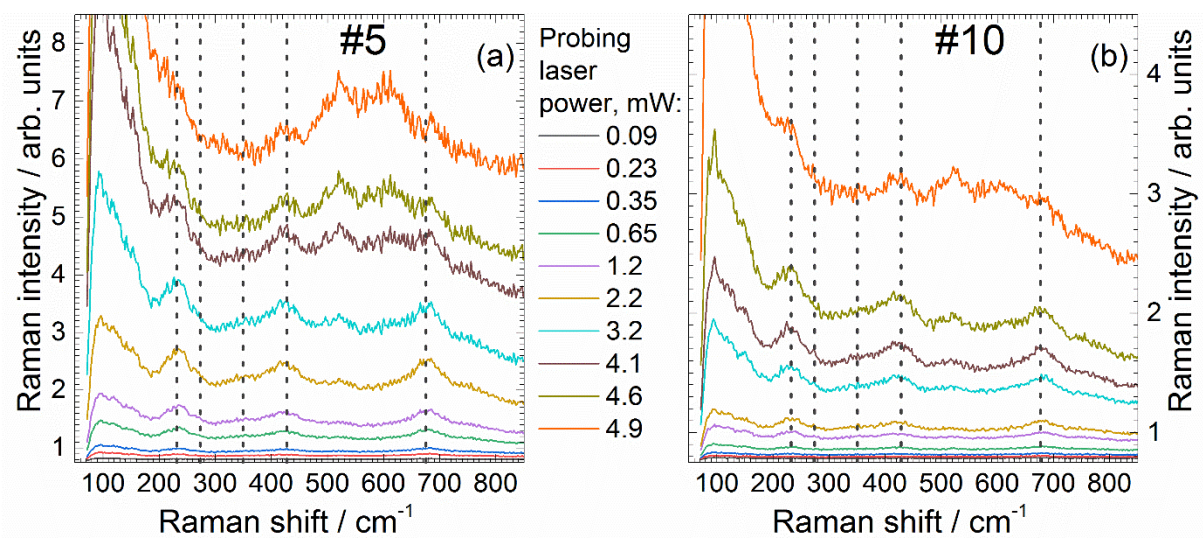


Figure S3. Raman spectra evolution with the probing laser power growth for particles #5 and #10, degraded during measurement. The dotted lines indicate the positions of the main characteristic LTO bands.

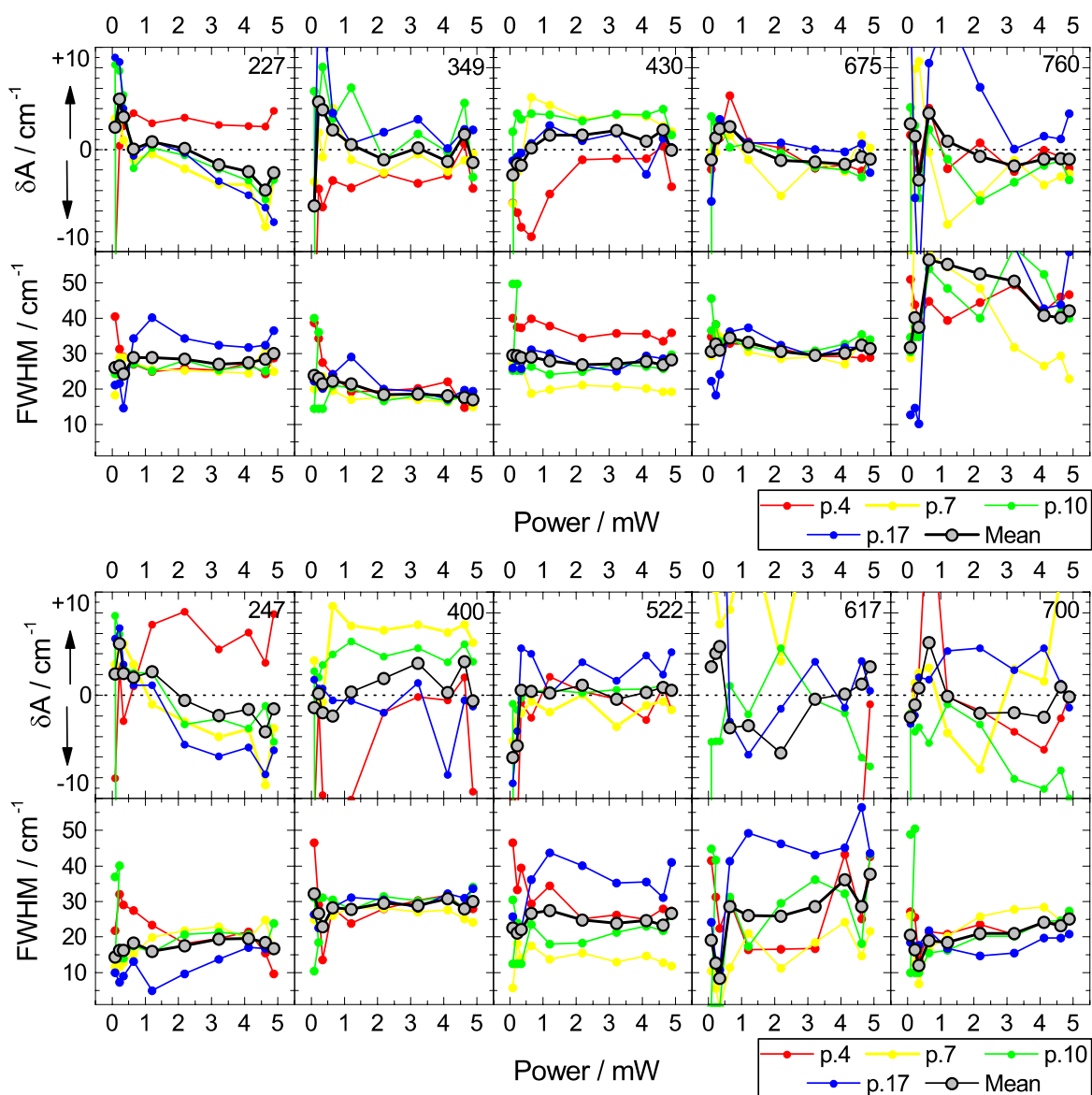


Figure S4. The dependence of Raman spectra parameters on the laser power for five single particles. Top rows correspond to deviation of band position from mean value ΔA (horizontal dotted line). Mean band positions are given in the top right corners. Bottom rows show the FWHM of the corresponding band. Colored circles and lines correspond to single particles, black ones correspond to mean values.

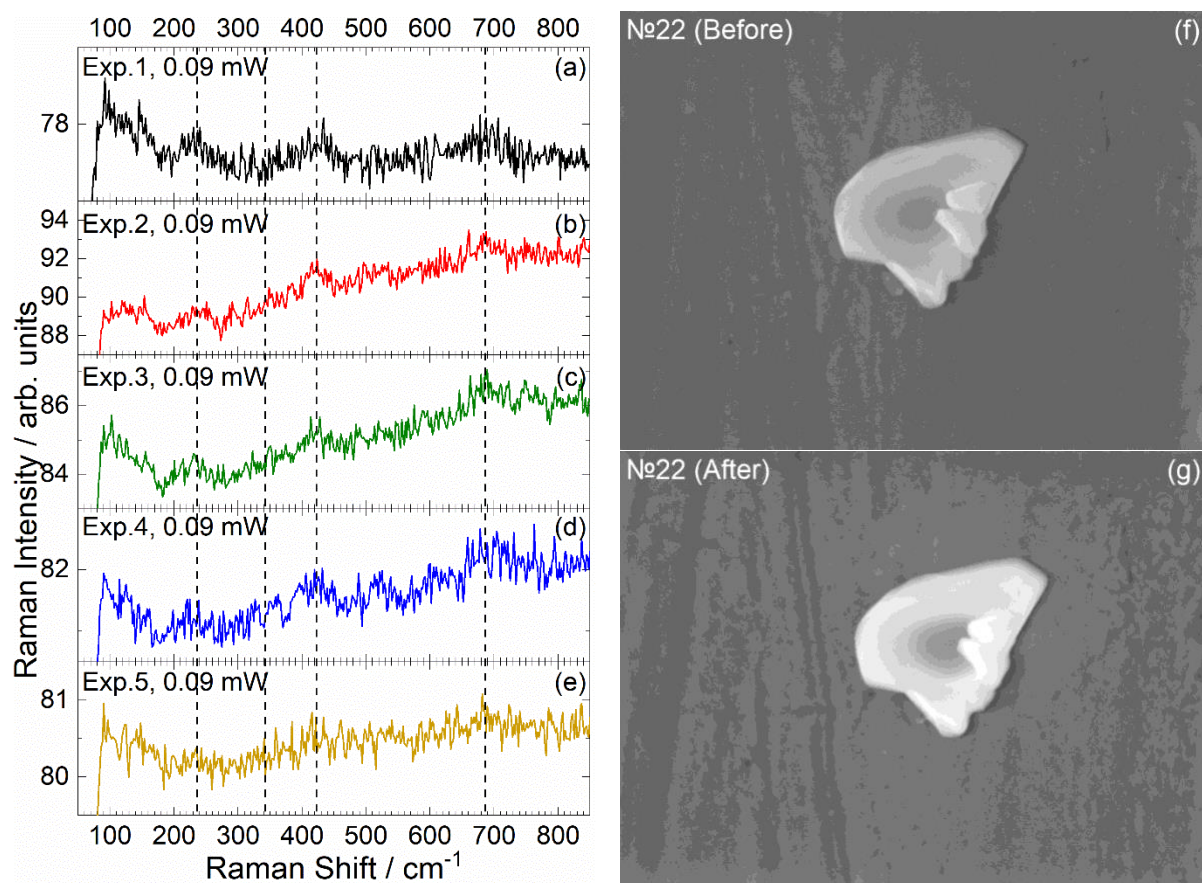


Figure S5. The evolution of Raman spectra for particle #22 (a)–(e) and its SEM images obtained between measurements 1 and 2 (f) and after (g) measurement 5. Second series of measurements, control group.

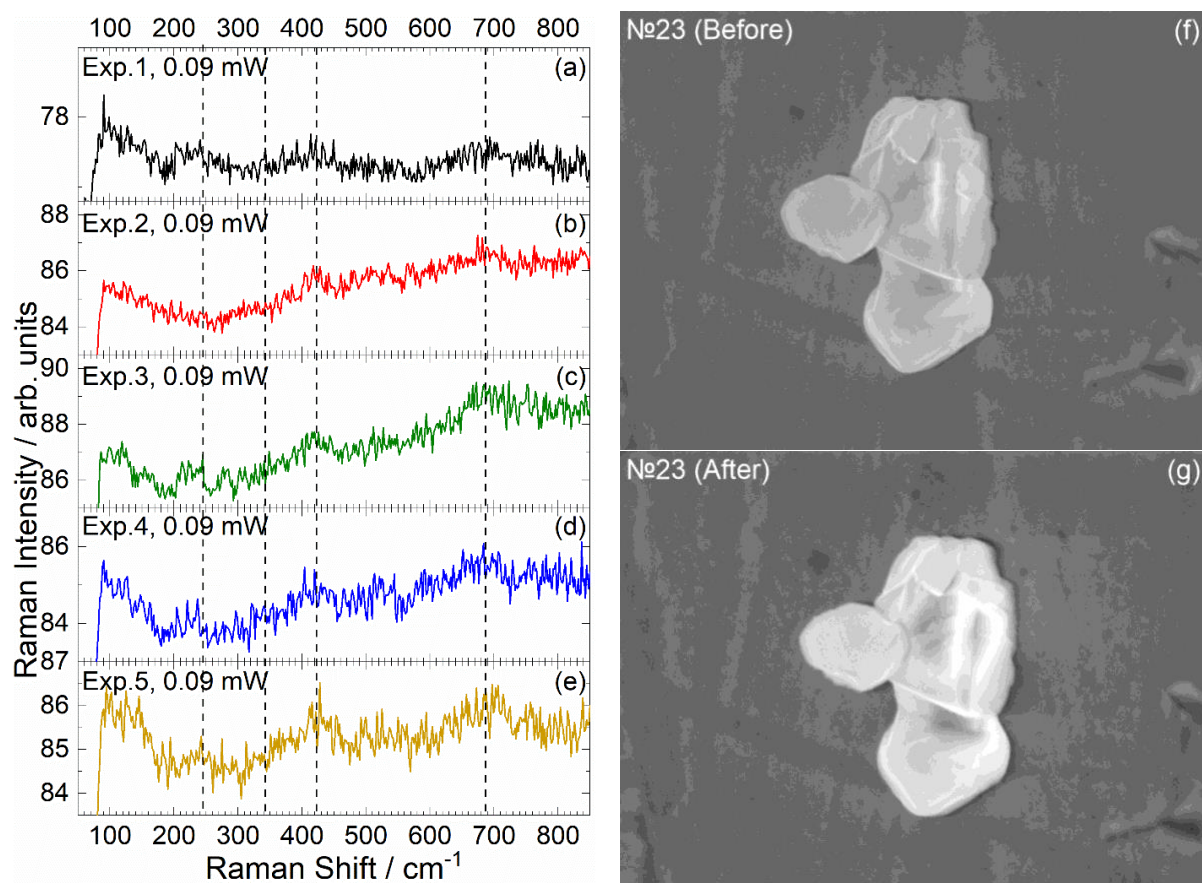


Figure S6. The evolution of Raman spectra for particle #23 (a)–(e) and its SEM images obtained between measurements 1 and 2 (f) and after (g) measurement 5. Second series of measurements, control group.

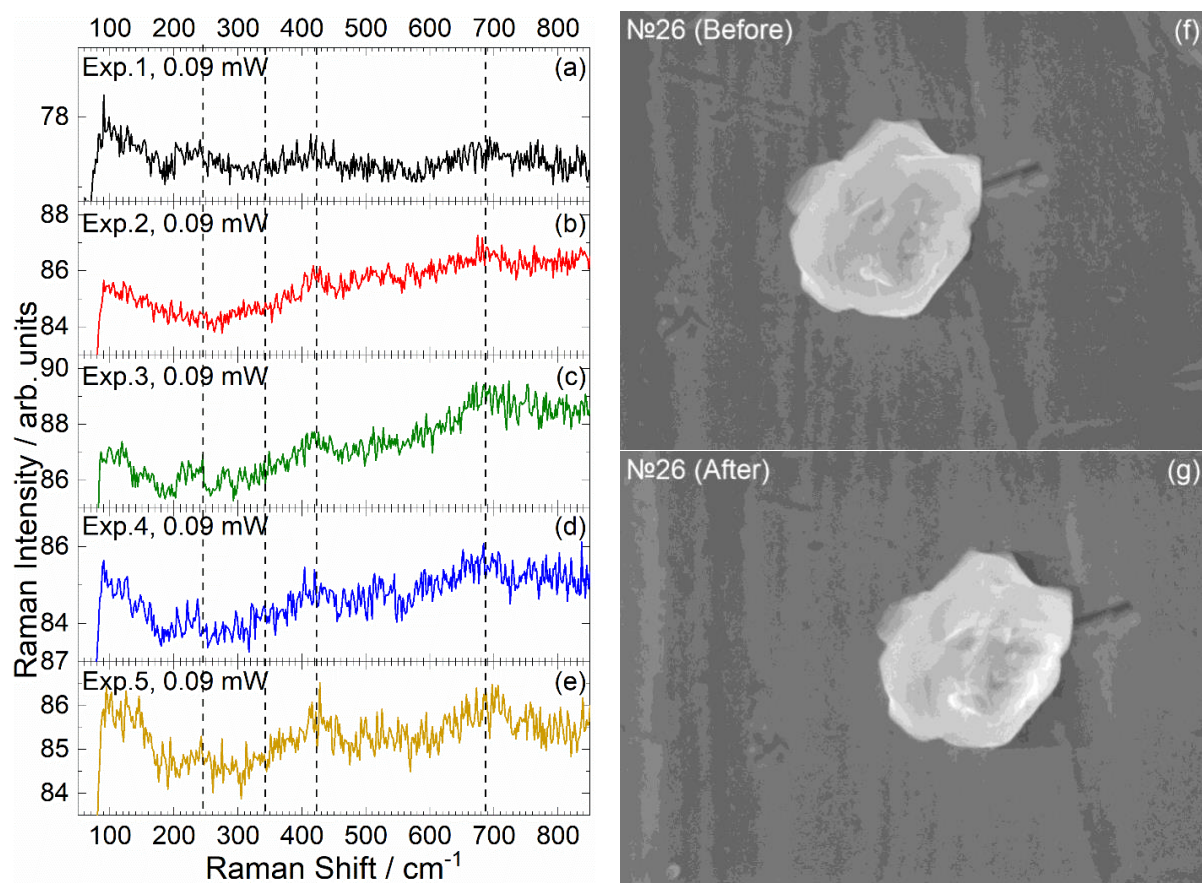


Figure S7. The evolution of Raman spectra for particle #26 (a)–(e) and its SEM images obtained between measurements 1 and 2 (f) and after (g) measurement 5. Second series of measurements, control group.

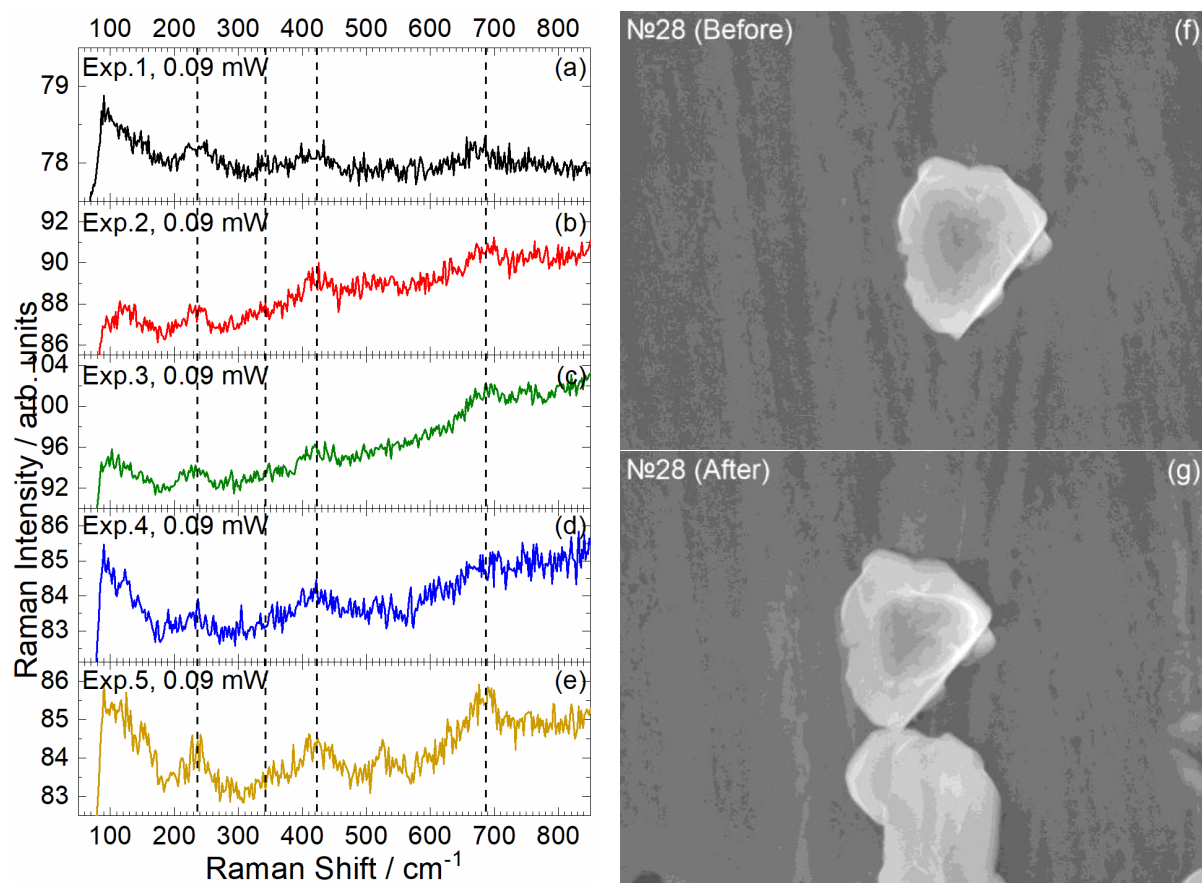


Figure S8. The evolution of Raman spectra for particle #28 (a)–(e) and its SEM images obtained between measurements 1 and 2 (f) and after (g) measurement 5. Second series of measurements, control group.

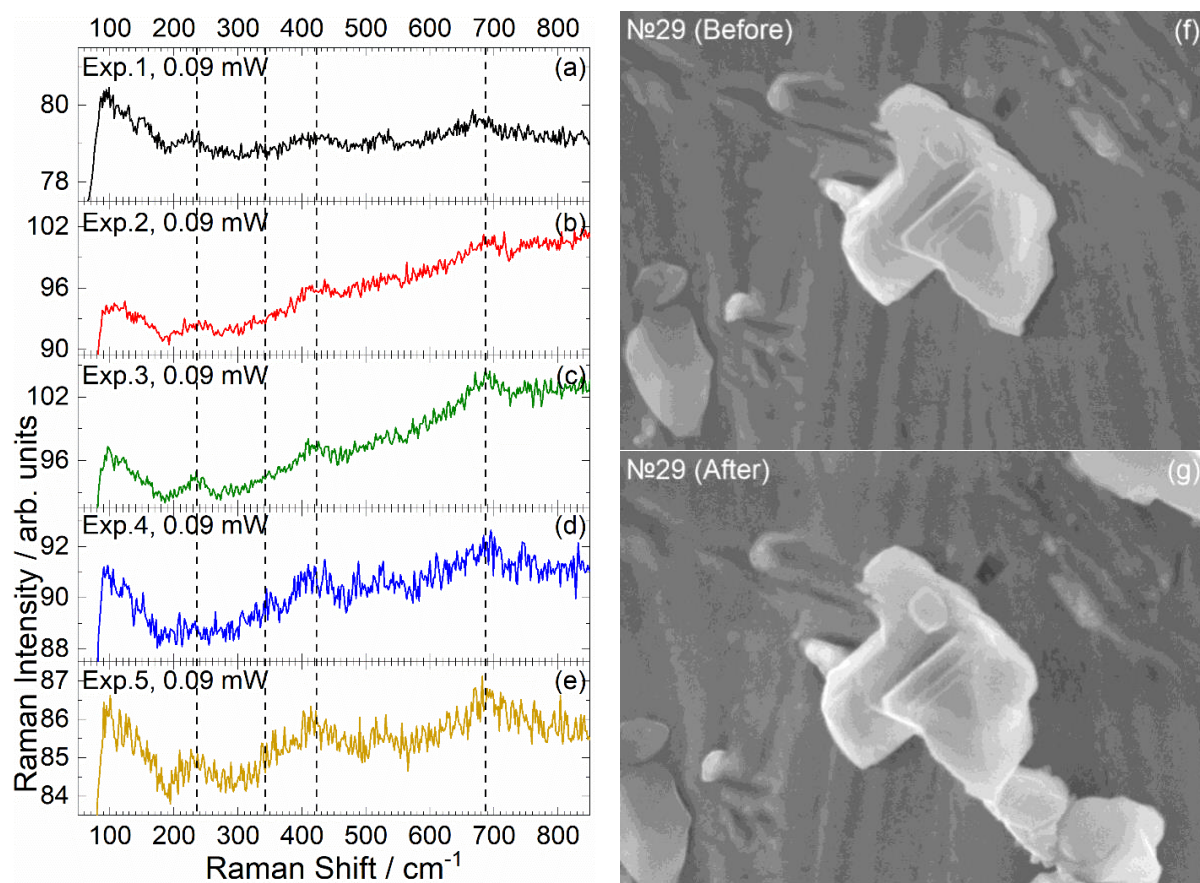


Figure S9. The evolution of Raman spectra for particle #29 (a)–(e) and its SEM images obtained between measurements 1 and 2 (f) and after (g) measurement 5. Second series of measurements, control group.

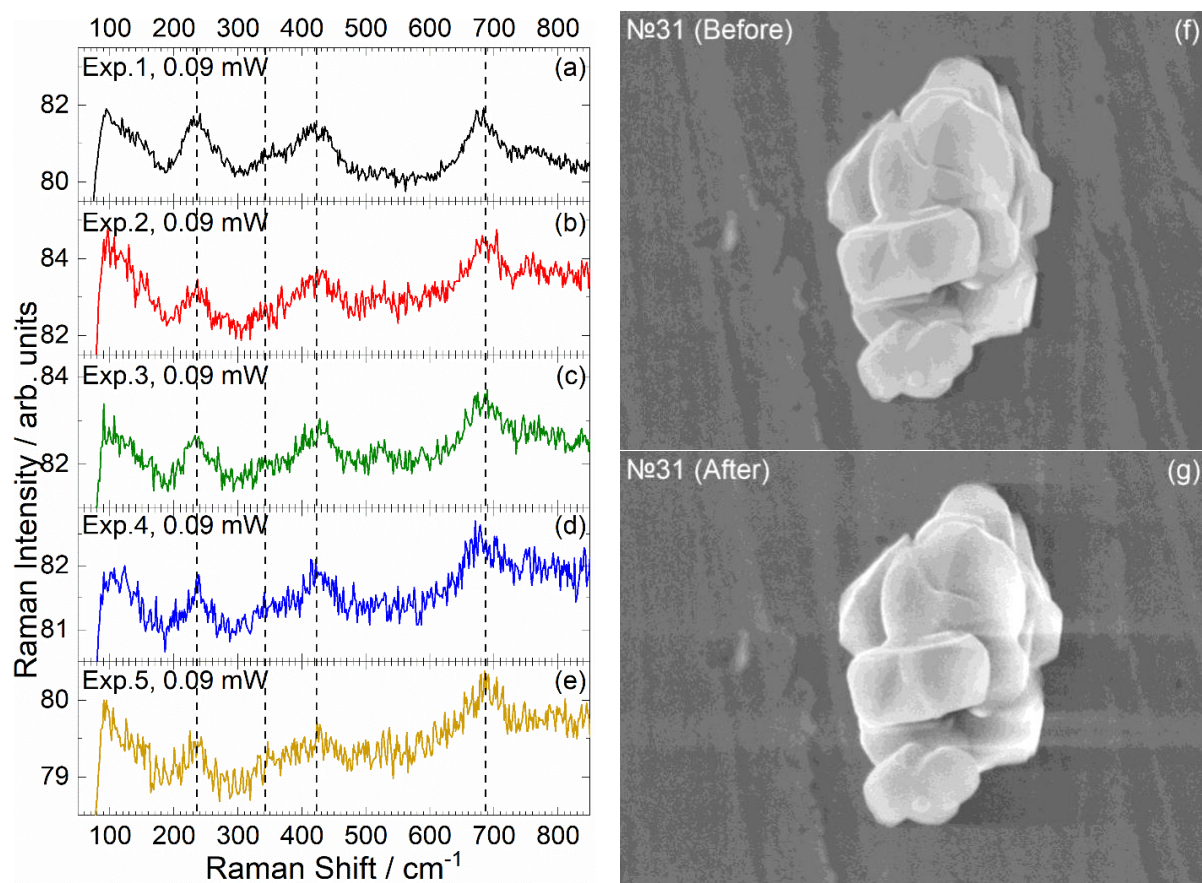


Figure S10. The evolution of Raman spectra for particle #31 (a)–(e) and its SEM images obtained between measurements 1 and 2 (f) and after (g) measurement 5. Second series of measurements, control group.

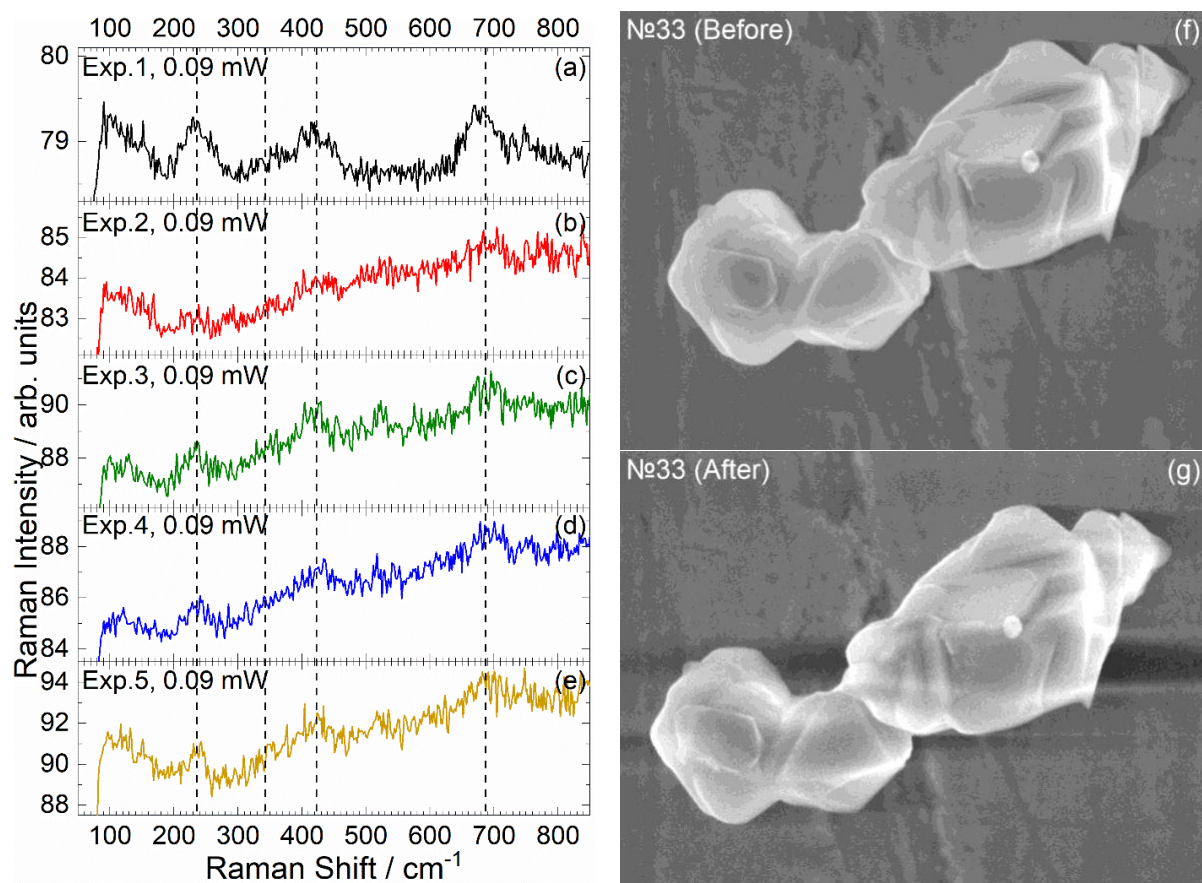


Figure S11. The evolution of Raman spectra for particle #33 (a)–(e) and its SEM images obtained between measurements 1 and 2 (f) and after (g) measurement 5. Second series of measurements, control group.

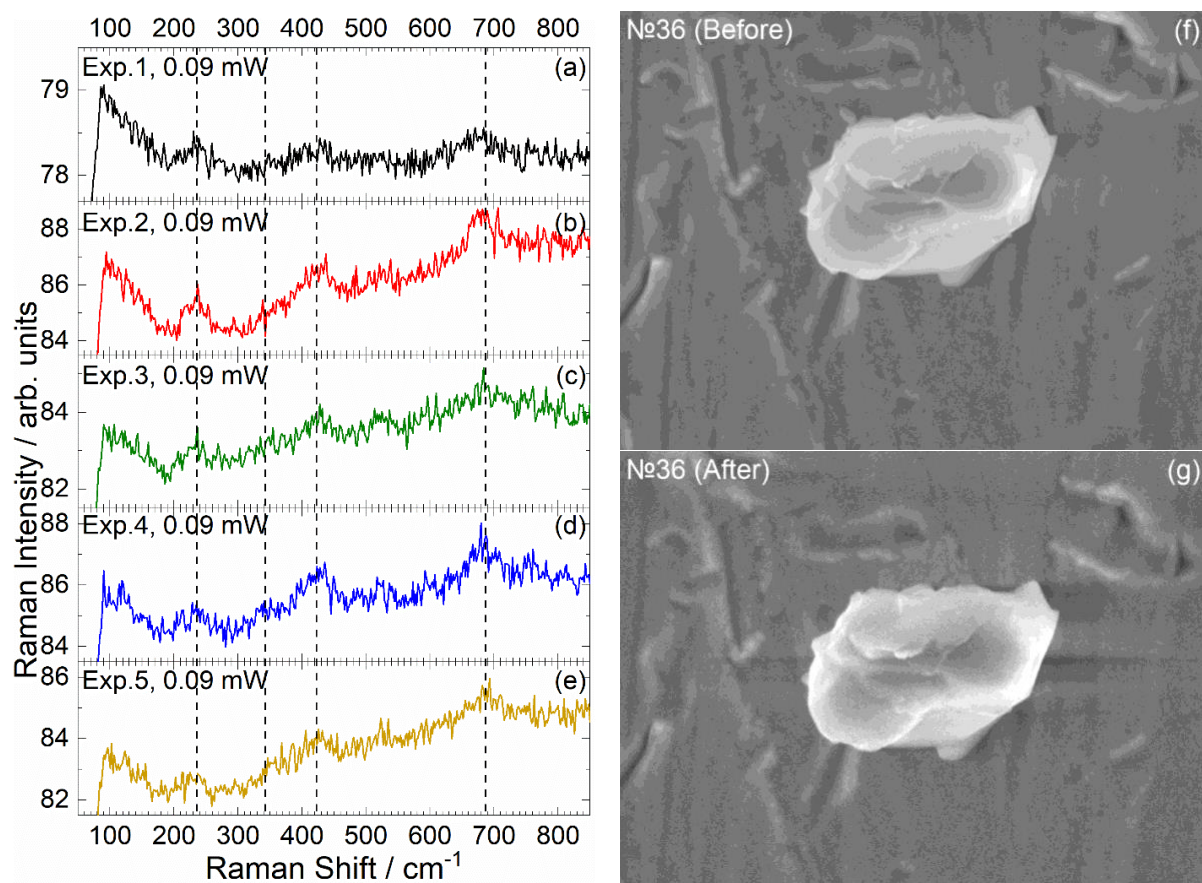


Figure S12. The evolution of Raman spectra for particle #36 (a)–(e) and its SEM images obtained between measurements 1 and 2 (f) and after (g) measurement 5. Second series of measurements, control group.

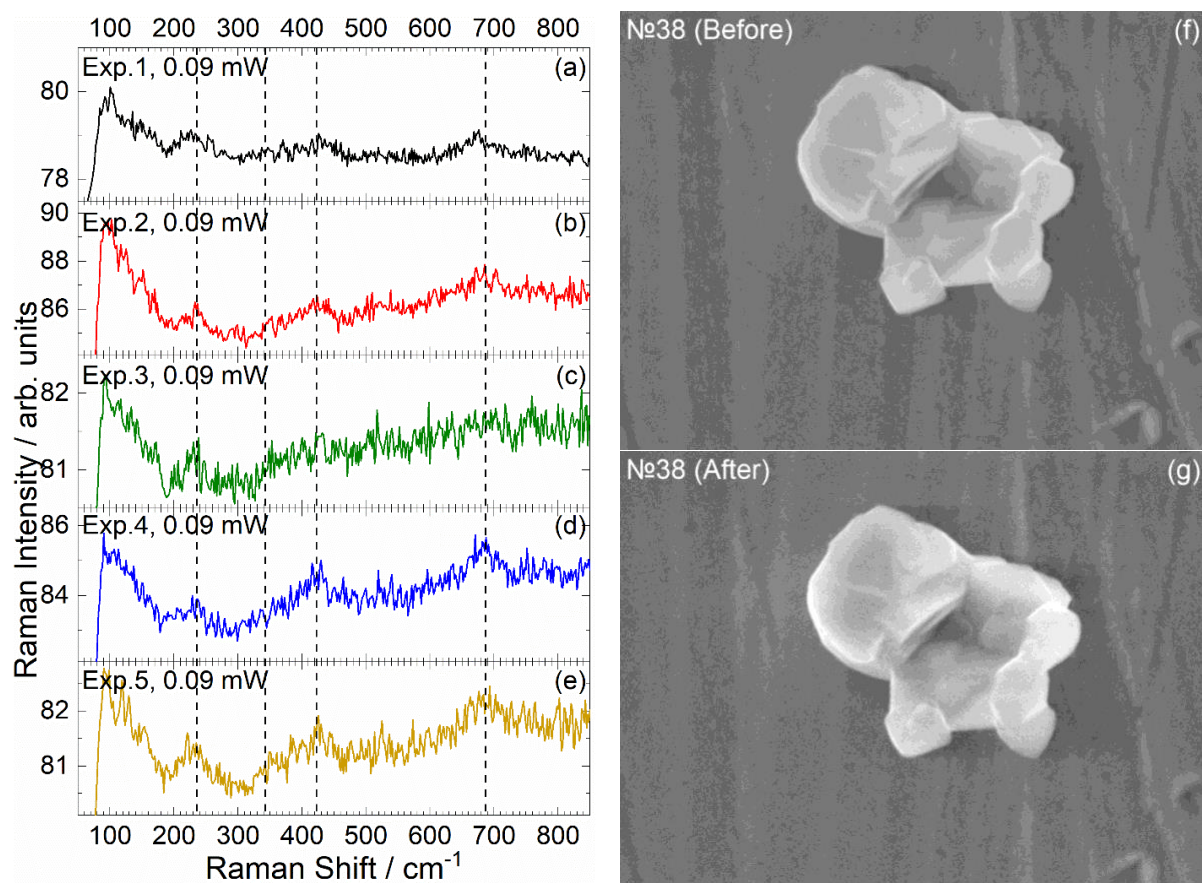


Figure S13. The evolution of Raman spectra for particle #38 (a)–(e) and its SEM images obtained between measurements 1 and 2 (f) and after (g) measurement 5. Second series of measurements, control group.

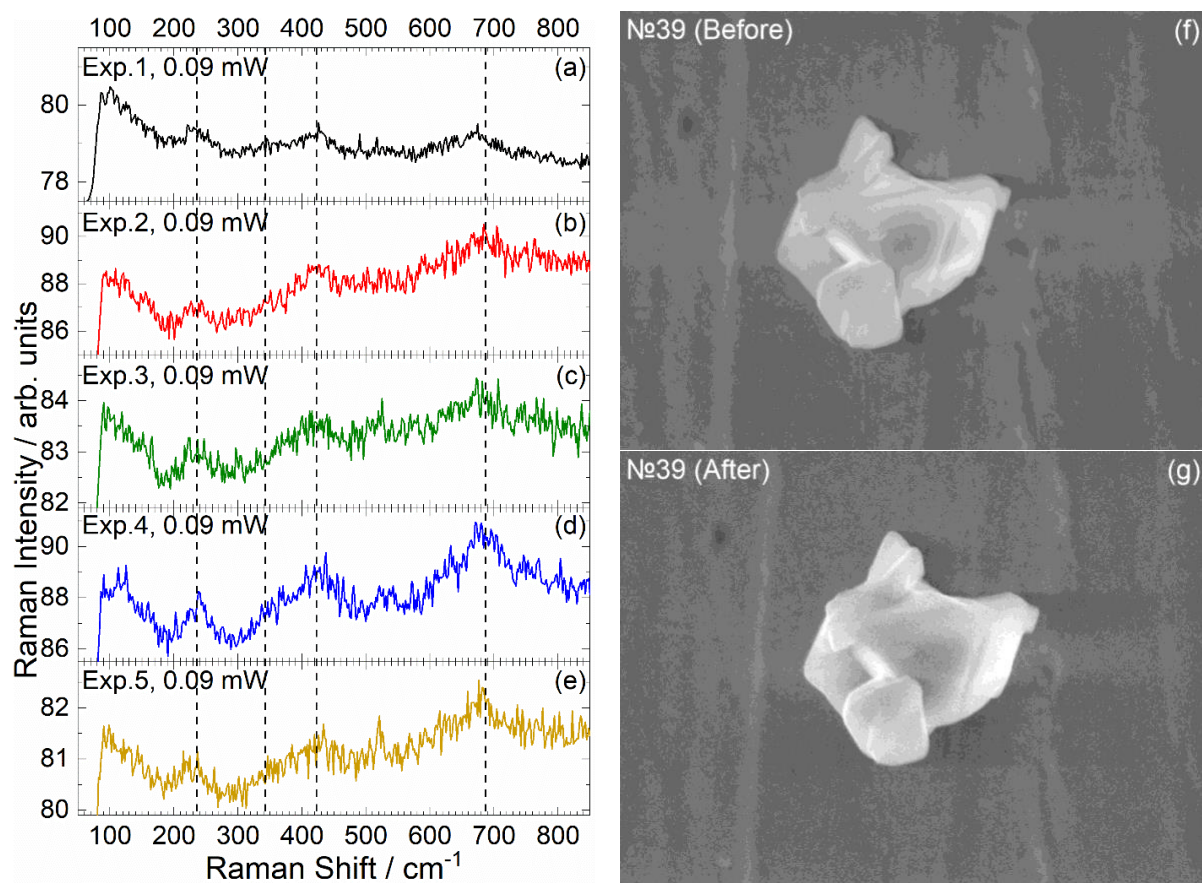


Figure S14. The evolution of Raman spectra for particle #39 (a)–(e) and its SEM images obtained between measurements 1 and 2 (f) and after (g) measurement 5. Second series of measurements, control group.

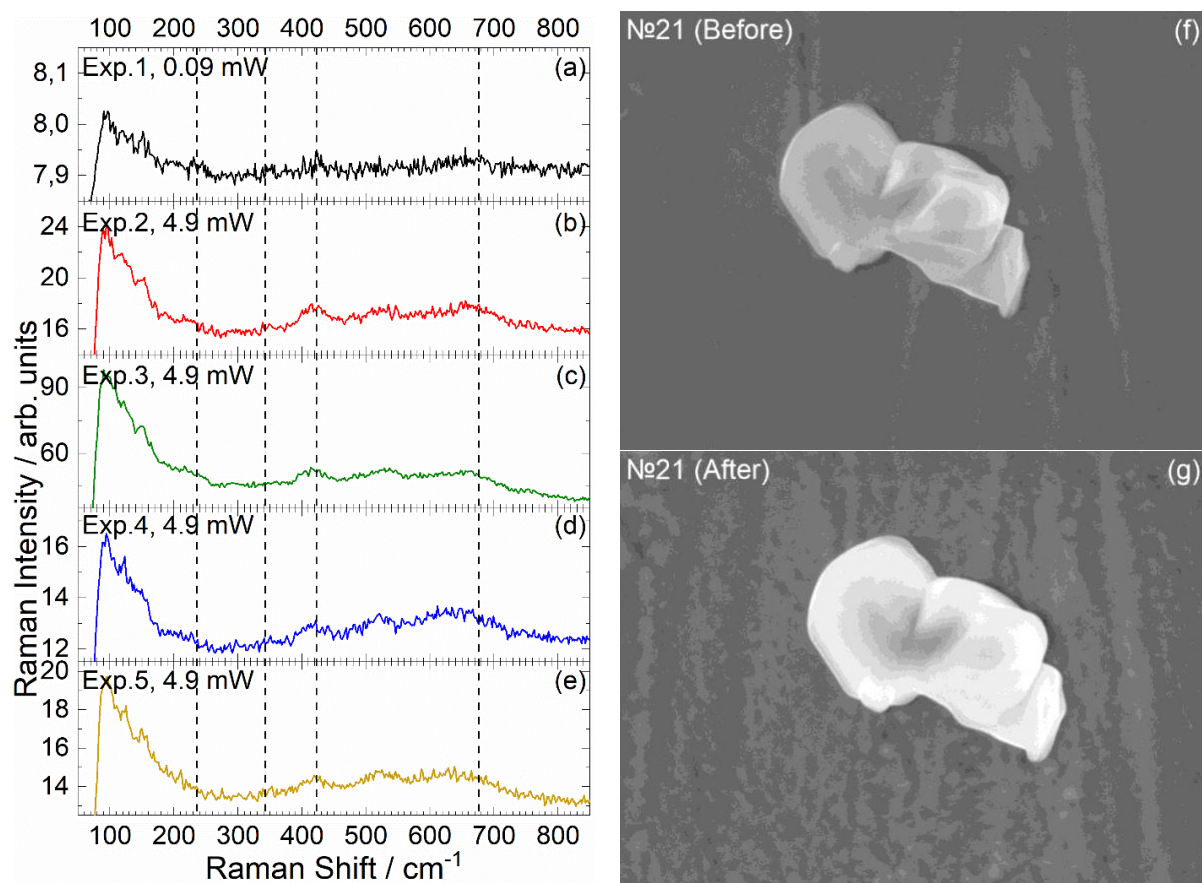


Figure S15. The evolution of Raman spectra for particle #21 (a)–(e) and its SEM images obtained between measurements 1 and 2 (f) and after (g) measurement 5. Second series of measurements, verification group.

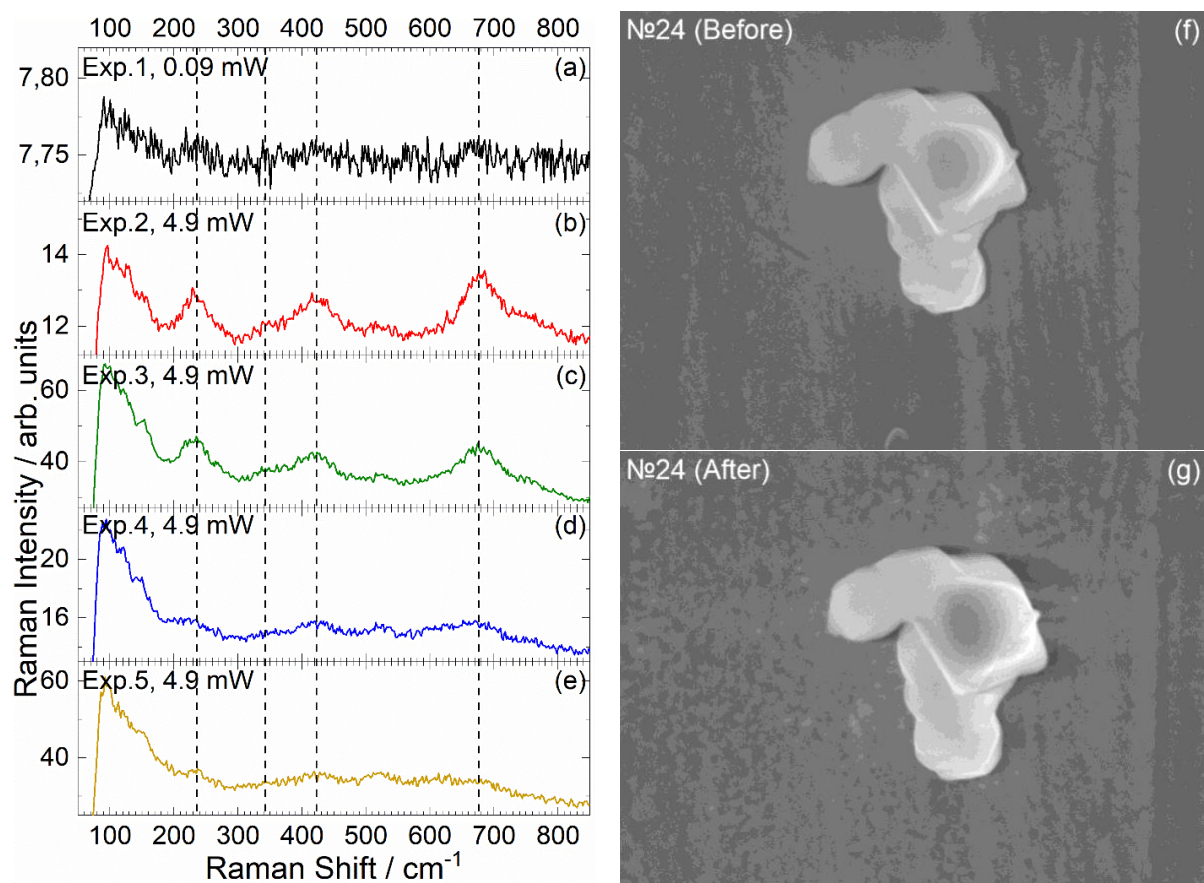


Figure S16. The evolution of Raman spectra for particle #24 (a)–(e) and its SEM images obtained between measurements 1 and 2 (f) and after (g) measurement 5. Second series of measurements, verification group.

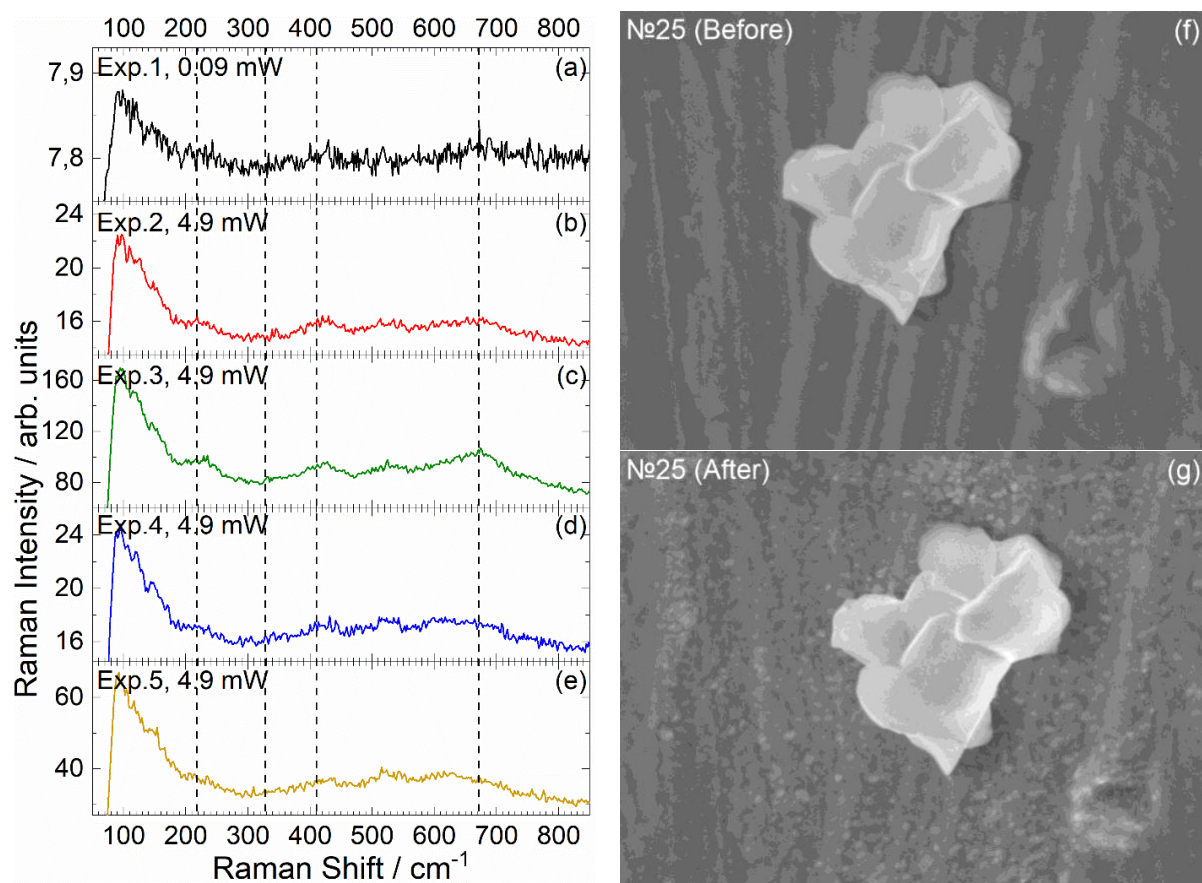


Figure S17. The evolution of Raman spectra for particle #25 (a)–(e) and its SEM images obtained between measurements 1 and 2 (f) and after (g) measurement 5. Second series of measurements, verification group.

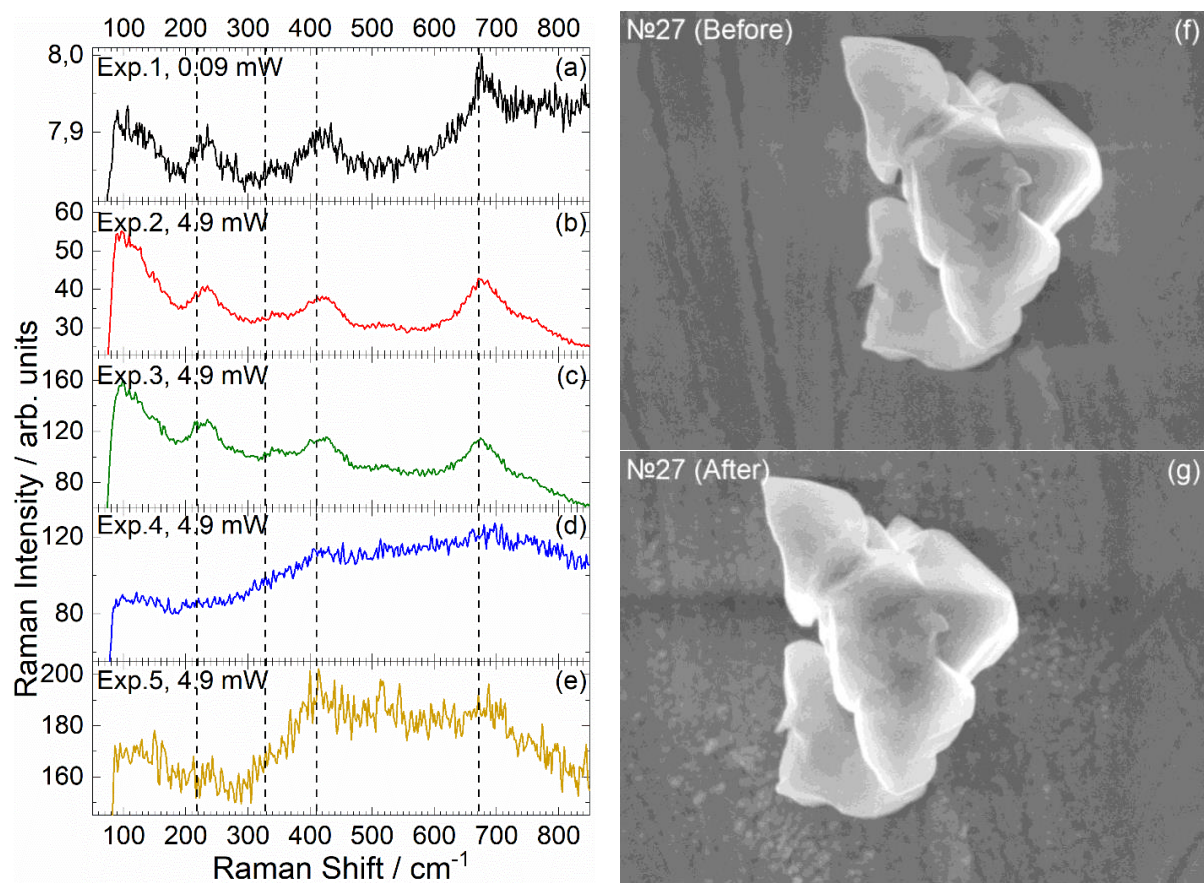


Figure S18. The evolution of Raman spectra for particle #27 (a)–(e) and its SEM images obtained between measurements 1 and 2 (f) and after (g) measurement 5. Second series of measurements, verification group.

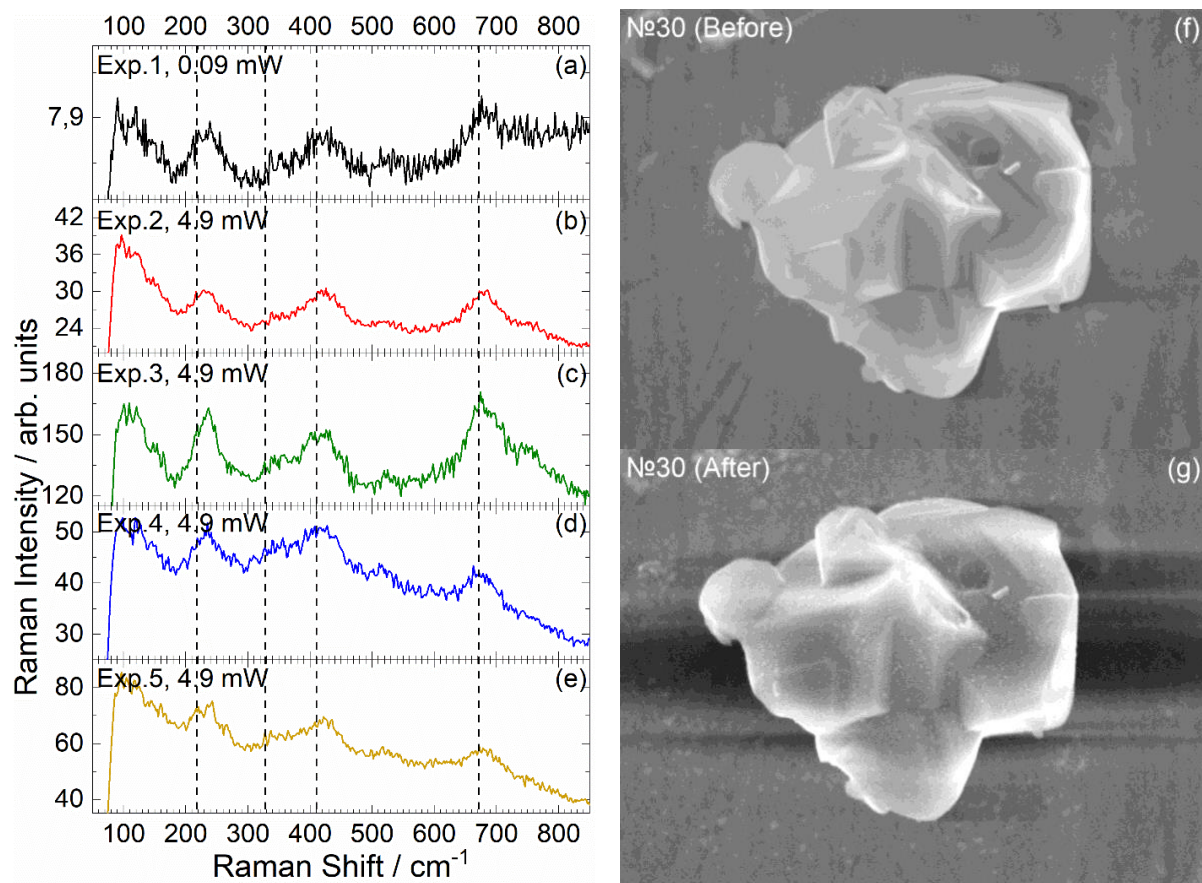


Figure S19. The evolution of Raman spectra for particle #30 (a)–(e) and its SEM images obtained between measurements 1 and 2 (f) and after (g) measurement 5. Second series of measurements, verification group.

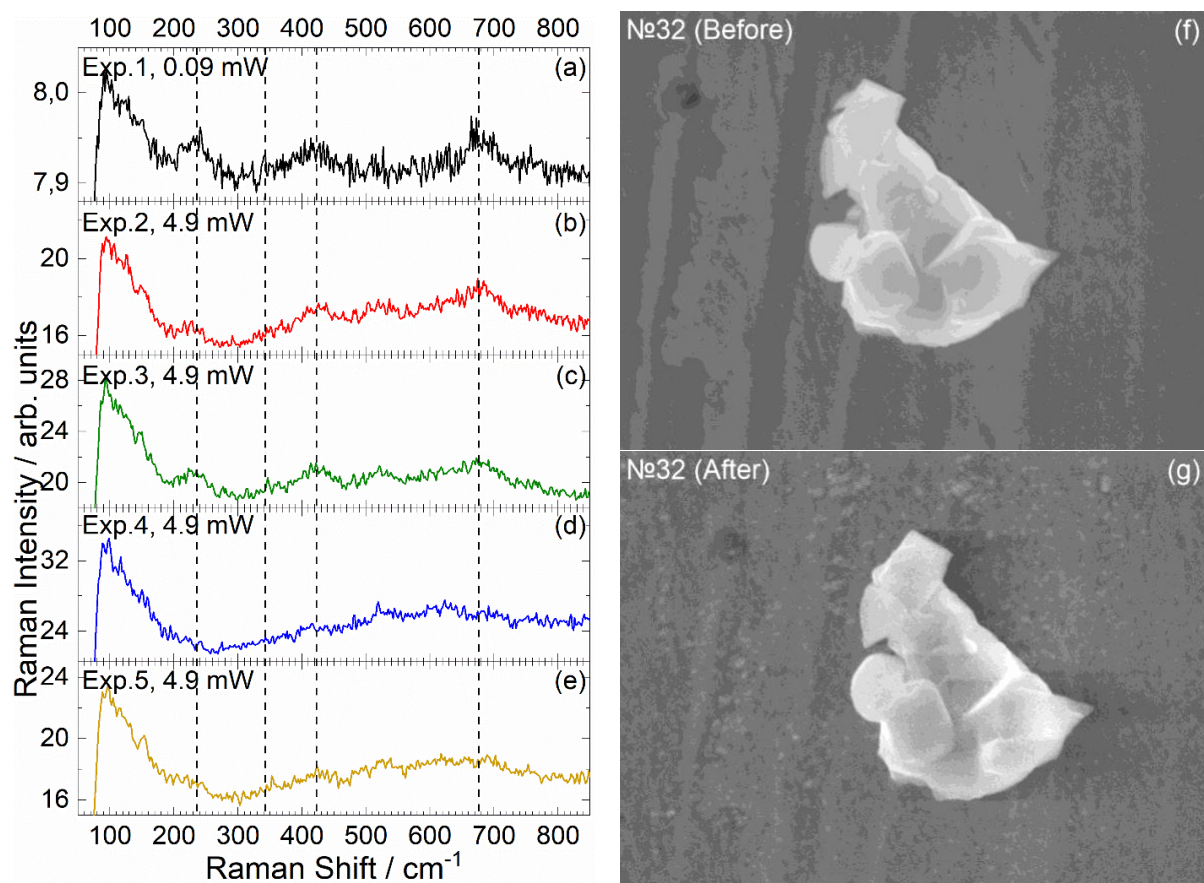


Figure S20. The evolution of Raman spectra for particle #32 (a)–(e) and its SEM images obtained between measurements 1 and 2 (f) and after (g) measurement 5. Second series of measurements, verification group.

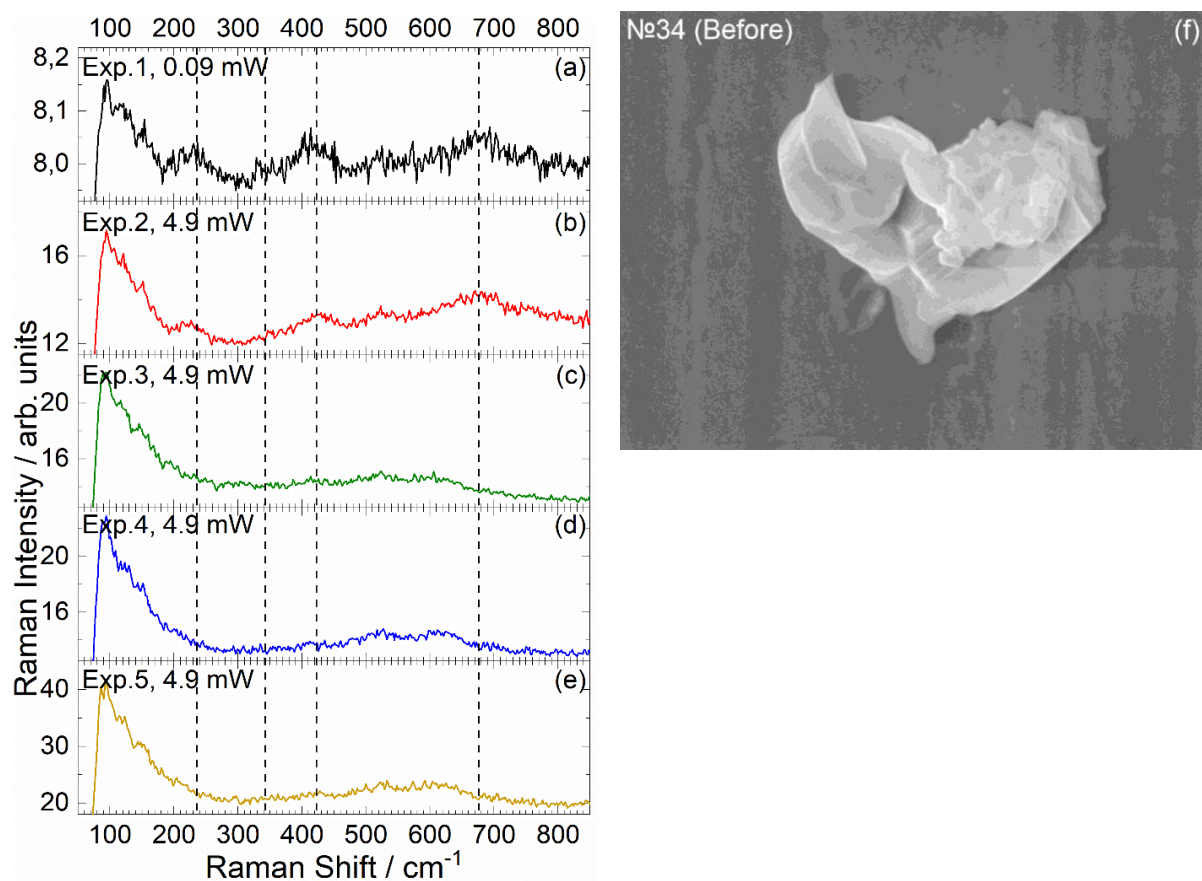


Figure S21. The evolution of Raman spectra for particle #34 (a)–(e) and its SEM images obtained between measurements 1 and 2 (f). The SEM image after measurement 5 did not reveal this particle, it may have been blown away when the air was pumped out. Second series of measurements, verification group.

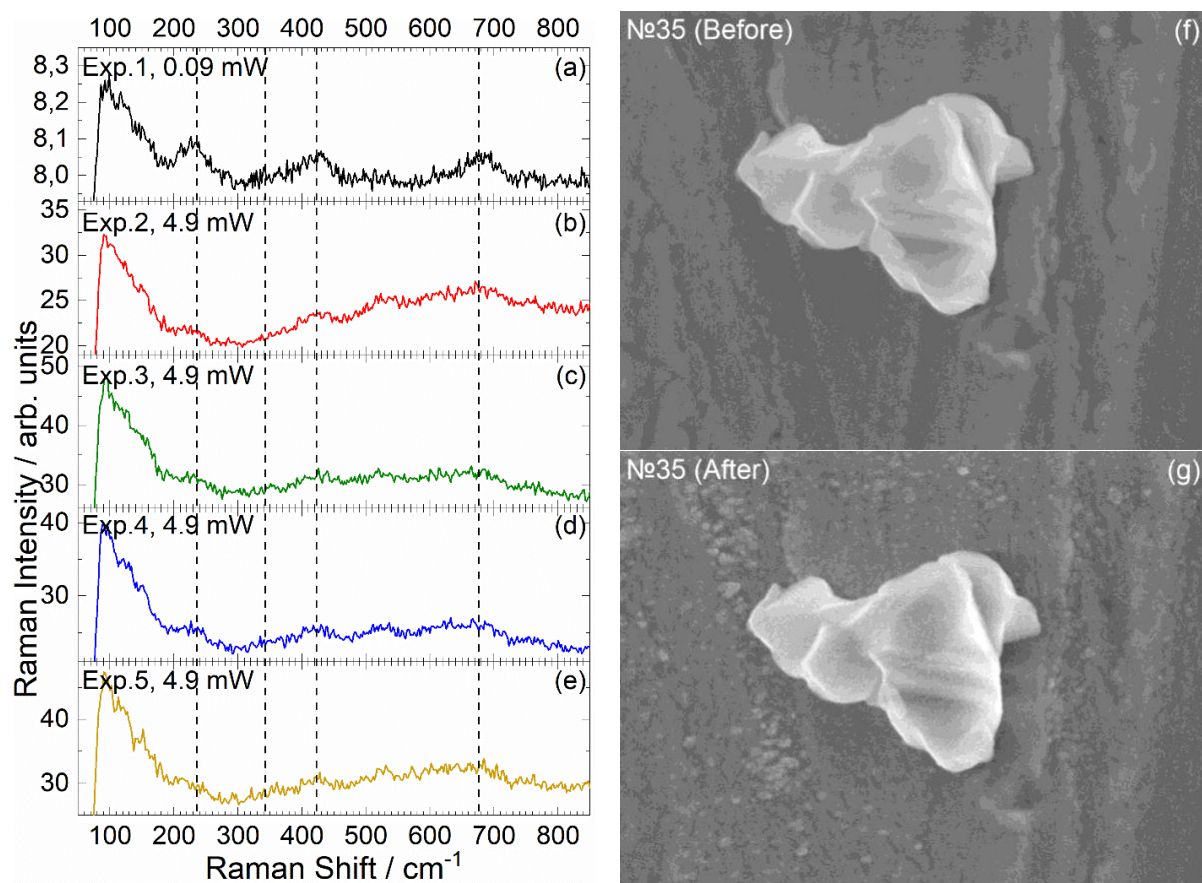


Figure S22. The evolution of Raman spectra for particle #35 (a)–(e) and its SEM images obtained between measurements 1 and 2 (f) and after (g) measurement 5. Second series of measurements, verification group.

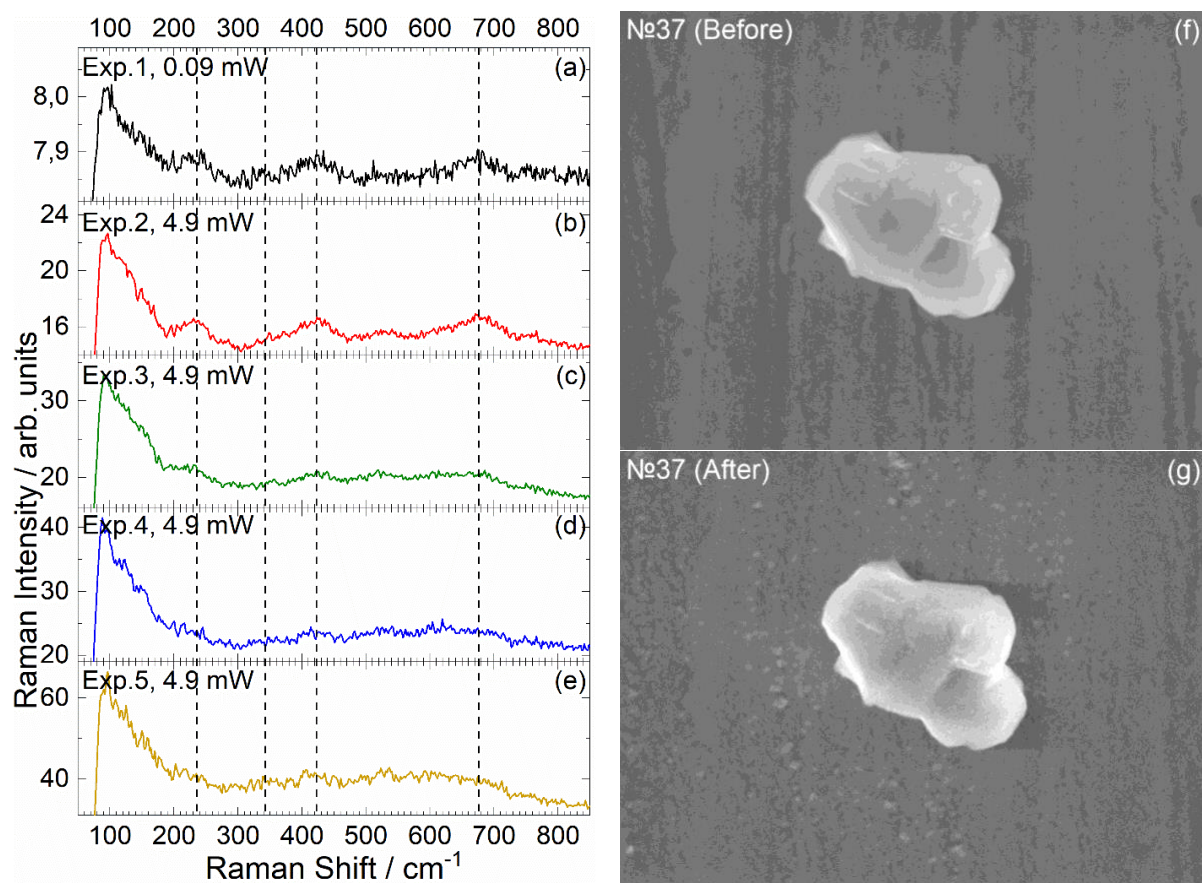


Figure S23. The evolution of Raman spectra for particle #37 (a)–(e) and its SEM images obtained between measurements 1 and 2 (f) and after (g) measurement 5. Second series of measurements, verification group.

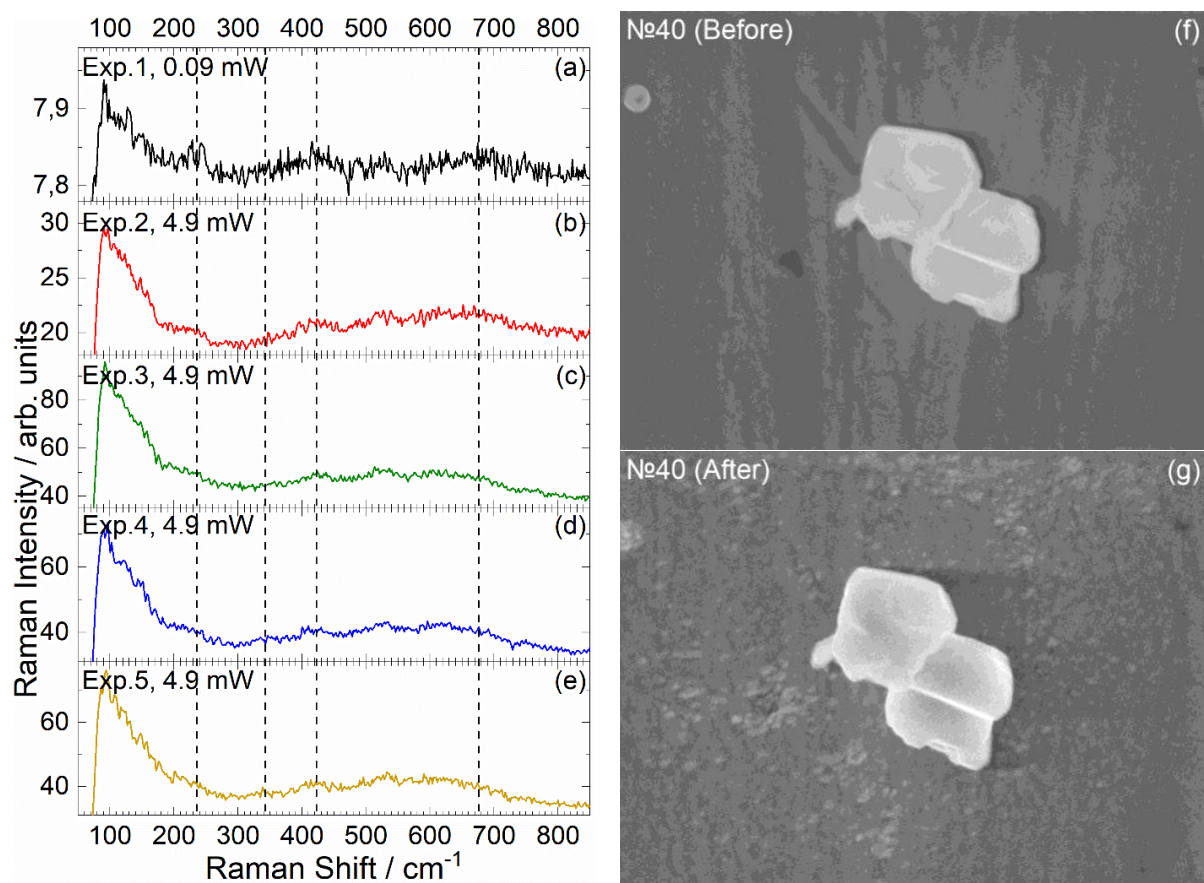


Figure S24. The evolution of Raman spectra for particle #40 (a)–(e) and its SEM images obtained between measurements 1 and 2 (f) and after (g) measurement 5. Second series of measurements, verification group.

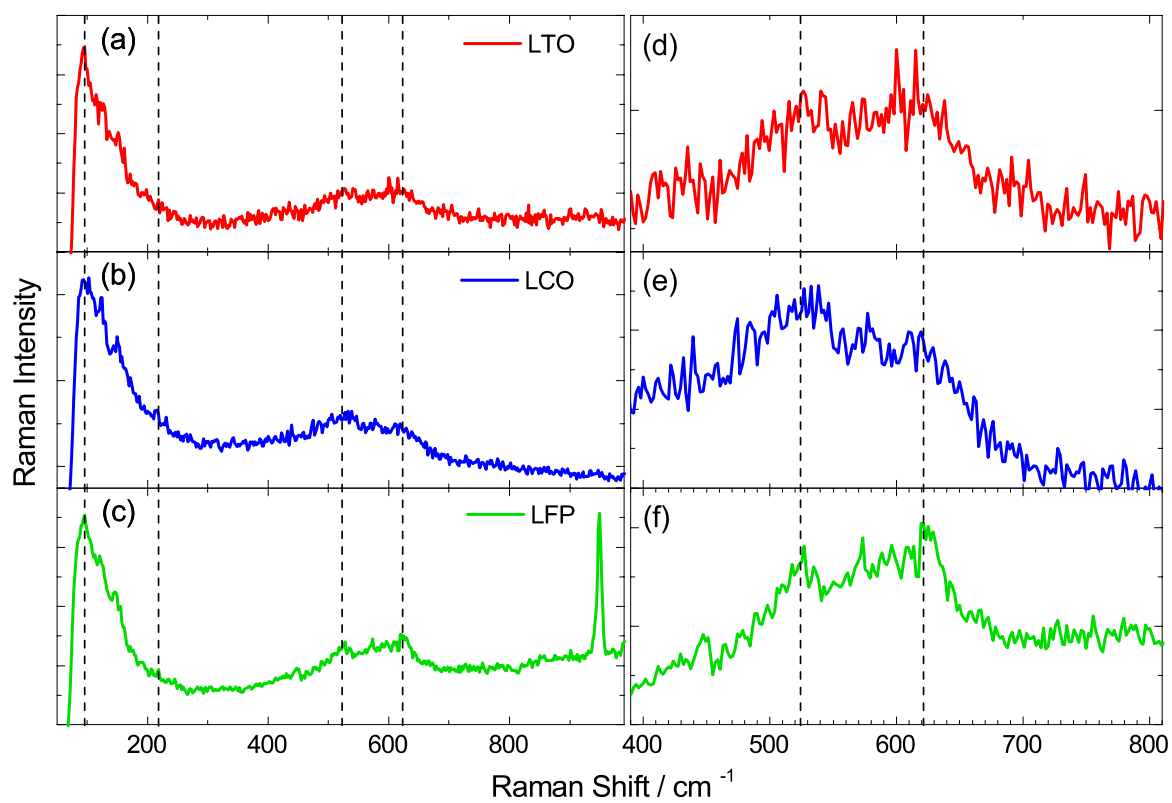


Figure S25. Comparison of (a), (d) LTO, (b), (e) LCO, and (c), (f) LFP particles on a copper substrate after laser-induced degradation. Graphics (d)–(f) are rescaled versions of (a)–(c).