Supplementary information

Enhanced SiV photoluminescence by oxidation induced nano-structures on diamond particle surface

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S1: The SiV normalized intensity of all samples.

Figure R1 shows the PL spectra of diamond particles in the range of 550 to 800 nm. In addition to the SiV PL peak at 738 nm, there is a signal about diamond properties near 570 nm including the diamond peak at 572 nm. The normalized intensity of SiV peak is characterized by the intensity ratio of SiV peak at 738 nm to diamond peak signal at 572 nm in PL spectrum. Generally, if the diamond particle size is bigger, its SiV emission will stronger because it contains more color centers. At the same time, the intensity of the diamond peak in PL spectrum increase simultaneously. Therefore, the normalized intensity can represent the SiV PL per Volume of diamond, which relates to the SiV density.

For these two sets of samples, the normalized intensity of SiV increases first and then decreases with the increase of oxidation time, which indicate that the SiV density increase by short term oxidation treatment while it decreases if the oxidation is too long. It is observed that the amplitude of variation during the oxidation is less than 2 times compared to the unoxidized sample. The absolute numerical intensity of the collected SiV PL (as Figure 1 in manuscript shown) is much larger than this.

Moreover, the maximum of SiV normalized intensity is obtained when the oxidation time is 60 and 30 min for the 2.5 kPa and 3.5 kPa samples, respectively. That is to say, at this time, the SiV center concentration of the signal acquisition area is the largest.

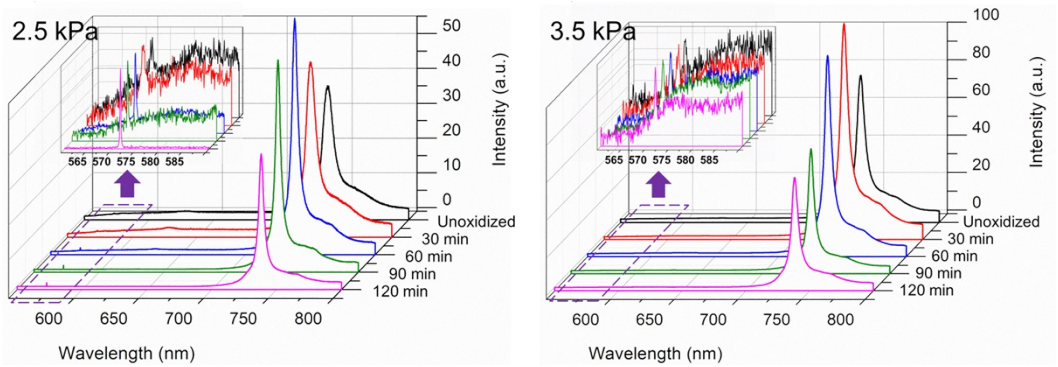

Figure. S1 The PL spectra of diamond particles in the range of 550 to 800 nm and they have normalized to the diamond peak at near 572 nm. The inset shows the enlarged view of the dotted box area in the PL spectra.