

## Supporting Information

“Comparison of photoluminescence properties of semiconductor quantum dots and non-blinking diamond nanoparticles. Observation of the diffusion of diamond nanoparticles in living cells.”, O. Faklaris et al.

### Optical setup

The **experimental setup** used to study the single-nanoparticle (QDs and PNDs) photoluminescence analysis is depicted on **Figure S1**.

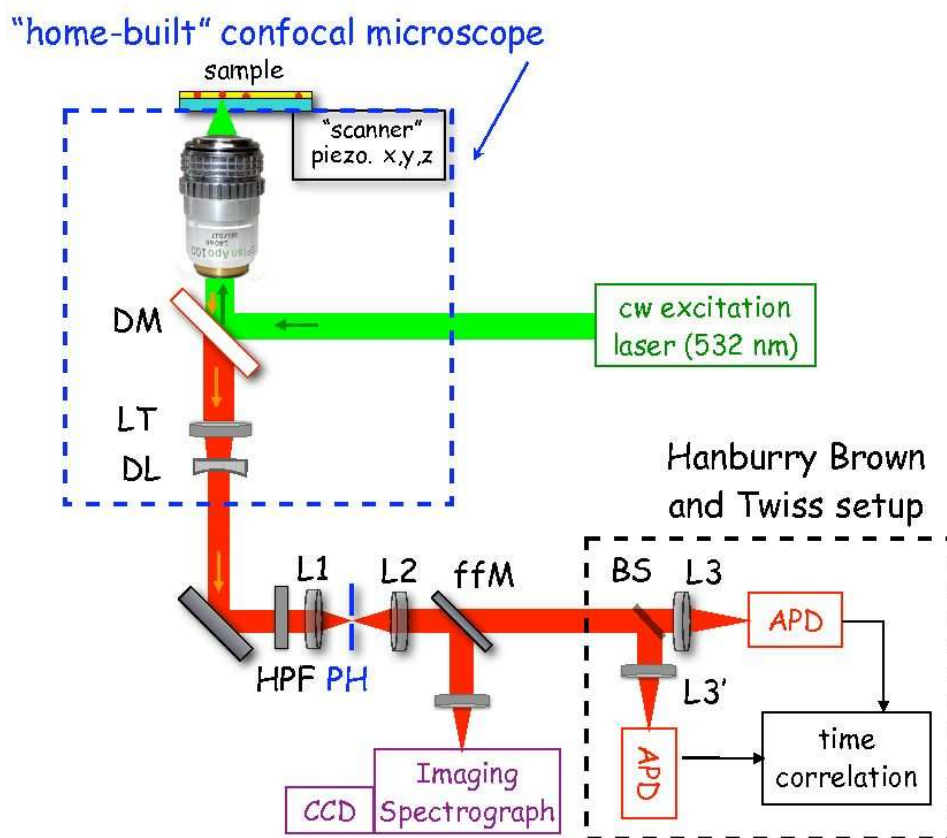


Figure 1: Optical setup used to study single-particle photoluminescence. Surrounded by the blue dashed-line box: the home-made confocal microscope. The Hanbury Brown and Twiss time correlation system is depicted in the black dashed-line box.

The **home-made confocal microscope**, relies on a Nikon TE300 stand, equipped with a closed loop piezoelectric stage three-axis scanner (*Tritor 102*, Piezोजना, Germany). After its reflection on the dichroic mirror DM (*DCLP 540*, Chroma Corp., USA), the excitation laser beam (cw 532 nm) is focused by an oil immersion objective (Nikon Apochroma,  $\times 60$ , NA=1.4) onto the sample. The fluorescence is collected by the same objective, making a collimated beam going through the 200 mm focal length microscope lens tube (LT).

Considering the microscope objective specifications, the Airy disk diameter (distance between the two first minima) in the microscope imaging plane (at the bottom of the stand) is equal to  $30\ \mu\text{m}$ . However, we modified the microscope in order to get a collimated beam at its output port. This modification consists in the addition of a diverging lens DL (focal length:  $-125\ \text{mm}$ ) after the lens tube turning the beam back into a collimated one, easier to handle for further propagation. The collimated output beam is then focused by the L1 lens ( $100\ \text{mm}$  focal length) into the pinhole (PH). The addition of these two lenses (DL and L1) results in an increase in Airy disk size from  $30$  to  $50\ \mu\text{m}$  which is why we selected a  $50\ \mu\text{m}$  diameter pinhole.

The residual excitation laser light is removed with the high-pass filter HPF having a transmission of 97% between  $539$ - $1200\ \text{nm}$  (*RazorEdge LP03-532RU-25*, Semrock, USA).

The photoluminescence spectrum is acquired with the addition (beam intercepted with a flip-flop Mirror (ffM)) of an imaging spectrograph, relying on a simple concave grating (30% maximum efficiency in its first diffraction order) coupled to a cooled CCD array (back-illuminated array *DU-420-BV*, Andor Technology, Ireland).

The **Hanbury Brown and Twiss** time-intensity correlation setup consist in two avalanche photodiodes (APD; *SPCM-AQR14*, Perkin-Elmer, Canada) in the single-photon counting mode, on both side of a non-polarizing 50/50 beam-splitter (BS), connected to a time-correlation electronics: a Time to Amplitude Converter (*Ortec Model 566*, Ametek Inc., USA) with its a-output linked to a multichannel analyzer (*Ortec 926-M32-USB*, Ametek Inc., USA).

## Supplementary measurements

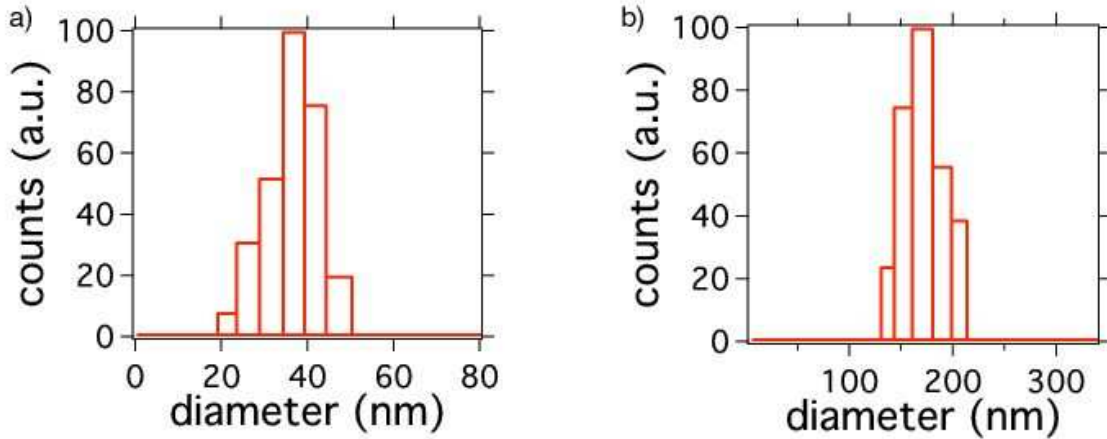


Figure 2: Size characterization of PNDs using Dynamic Light Scattering (apparatus: *BI-200SM*, Brookhaven Instruments Corp., USA). a) PNDs of  $41\ \text{nm}$  mean size. b) PNDs with a  $163\ \text{nm}$  mean size.

The **size distribution measurements** of the two different nanodiamond types studied by video microscopy are shown of **Figure S2**.

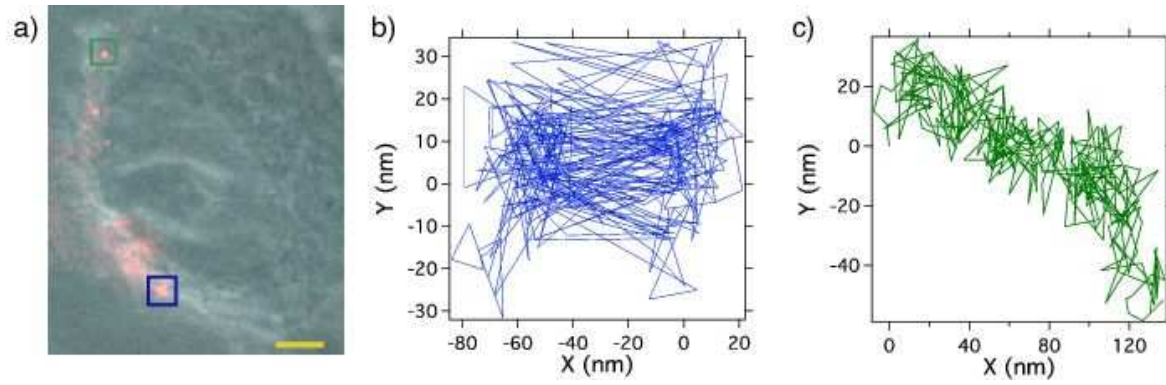


Figure 3: Trajectories of internalized nanodiamonds in the same cell as the one presented in the main text. a) Phase contrast image of cell merged with the fluorescence image of PNDs (in red); scale bar  $3 \mu\text{m}$ . b) Highly confined trajectory of the PND surrounded by the blue square in the image a). c) Trajectory of the PND surrounded by the green square.

**Figure S3** shows two additional examples of trajectories of internalized PNDs in the cell. The **Fig. S3b** shows a PND having a highly confined motion. It is probably an aggregate, since its fluorescence spot is not diffraction limited. **Fig. S3c** displays the less confined trajectory, slightly directed, in comparison to the other PND (green square). In the latter case, the lateral spatial broadening of the order of 25-30 nm corresponds to the noise on the position calculated by the *Image J* “ParticleTracker” plugin. Finally, let us mention that we did not observe any drift of the cell during these measurements.

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