Electronic Supplementary Material (ESI) for Nanoscale Advances.

Supporting Information

Quantum thermometric sensing and analysis system by using fluorescent nanodiamonds for the evaluation of the living stem cell function according to intracellular temperature

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H. Yukawa and M. Fujiwara contributed equally to the work presented here and should therefore be regarded as equivalent.

Supporting Figures

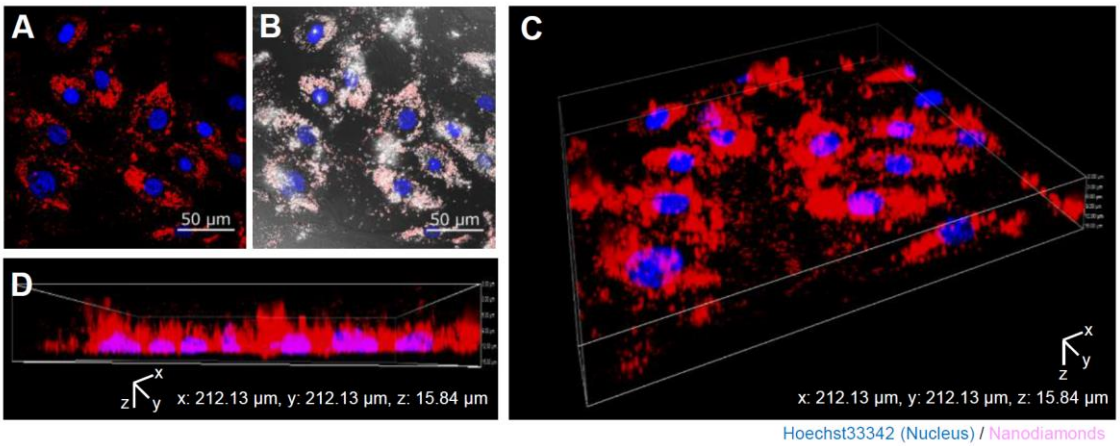

Figure S1. Observation of ASCs-FNDs**.** To investigate the transduction efficiency of FNDs to ASCs, ASCs were incubated with FNDs (250 µg/mL) in transduction medium (DMEM/F12 containing 2% FBS and 100 U/mL penicillin/streptomycin) at 37 °C for 24 h. The nuclei of ASCs were then stained with Hoechst33342 solution. The red fluorescence derived from FNDs transduced into ASCs was observed using high-speed multiphoton confocal laser microscopy, and ASCs were could to be labeled with FNDs with high efficiency (A-D).

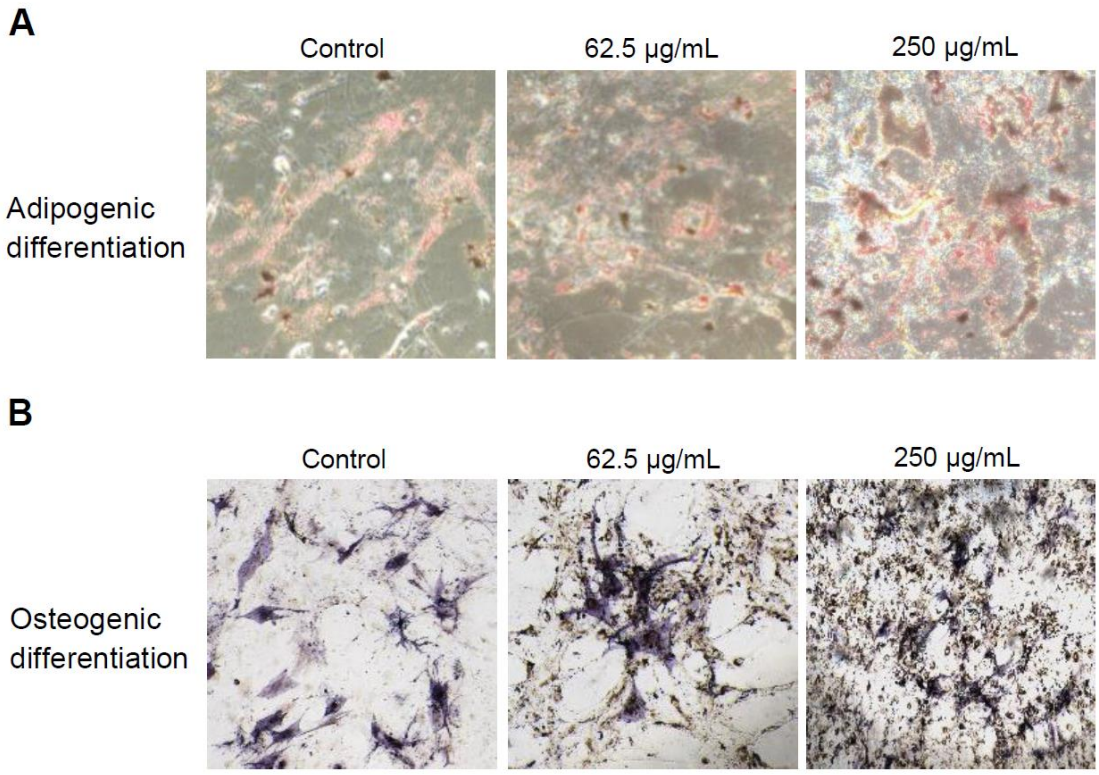

Figure S2. Differentiation ability of ASCs-FNDs**.** To investigate the influence of FNDs on the differentiation ability of ASCs, ASCs were labeled with FNDs (ASCs-FNDs), and then ASCs-FNDs were differentiated into adipocytes and osteocytes. The differentiation abilities of ASCs-FNDs into both adipocytes (A) and osteocytes (B) were similar to those of normal ASCs.

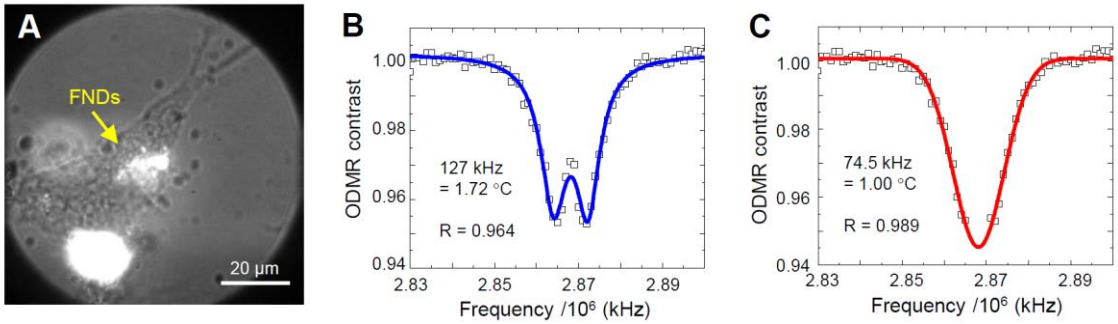

Figure S3. Quantum thermometry of ASCs-FNDs fixed on a coverslip in QTAS. A micrograph of ASCs in an in-house-crafted cell culture dish with white-light illumination and FND fluorescence (A). The ODMR spectrum of the FND indicated by a yellow arrow in (A) at 40.8 °C with fitted functions (B) and the same spectrum where the peak doublet was omitted from the fitting following the procedure reported previously (C).[22] The temperature-induced peak shift was in good agreement with the theoretical peak shift of 127 kHz calculated by ΔT = 1.72 °C, with the coefficient determined to be -74.5 kHz/°C. These results suggested that QTAS was able to detect the temperature changes occurring in fixed ASCs.