**Stability analyses of electron field emission in Q-carbon**

**(Supplementary)**

Micro Raman analyses have been performed on the DLC film (before annealing) and the Q-carbon composite sample (formed after annealing) used for FE measurements. Figure S1 (a) shows a Raman spectrum of the as deposited DLC film used to fabricate the Q-carbon composite structure. The Raman spectrum of the intermediate region in-between the Q-carbon clusters, amorphous carbon containing area, is shown in figure S1 (b). The Raman spectrum of the PLD target (graphite) is shown in figure S1 (c). The micro-Raman optical image of the Q-carbon composite film is shown in figure S1 (d). The dark spots in this image refer to the Q-carbon clusters.

The stable and persistent EFE current density obtained from Q-carbon over a long period of time supports the robust nature of Q-carbon under high applied electric field. In the porous amorphic diamond field emitters, researchers observed field induced damages during the EFE tests [35]. They also observed a change in the electrical properties of the emitter after the test. The room-temperature *I-V* characteristics of amorphic diamond films were different before and after the field emission test. Figure S2 shows almost no change in the room temperature *I-V* characteristics of Q-carbon sample before and after the EFE measurements in the voltage range in-between -10V and 10V, which implies that no field induced damage occurred in the Q-carbon sample.

Figure S1: Raman spectra of (a) the DLC film (before laser annealing), (b) amorphous carbon region in-between the Q-carbon clusters after laser annealing, (c) graphite target used for PLD, and (d) presents the micro-Raman optical image of the Q-carbon composite film.

Figure S2: *I-V* plots before and after EFE tests on the Q-carbon composite sample.