Growth of ultrananocrystalline diamond films on non-silicon substrates using electrophoresis-deposited nano-diamond as nucleation layer

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Ultrananocrystalline diamond (UNCD) films possess many marvelous physical and chemical properties and several of them actually exceed those of conventional microcrystalline diamond (MCD) films. The UNCD films possess good potential for device applications. However, efficient nucleation technique is required to grow uniform UNCD films in large area on these substrates. In this work, we will firSt report the utilization of nano-diamond layer electrophoresis-deposited on Si (for only 30 s) as nucleation layer for growing UNCD and MCD films on Si-substrate. The films obtained possess better good electron field emission as those grown from a nucleation layer on Si substrate, which was obtained through ultrasonication in diamond/methanol solution (for 45 min), viz. high efficiency on nucleating the UNCD film has been observed. In this work, we will demonstrate the novel nucleation technique to solve the difficulty in growing the diamond films on non-silicon substrates such as stainless steel.

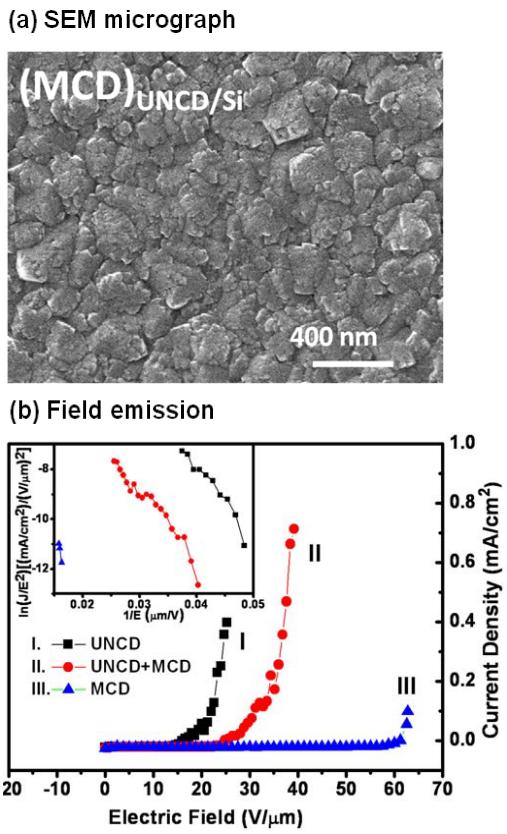

Figure 1 (a) The SEM micrograph of $(MCD)_{UNCD/Si}$ diamond films and (b) EFE properties of UNCD, MCD, $(MCD)_{UNCD/Si}$ diamond films

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