

Supporting Information for

Electrochemical Properties and Applications of Nanocrystalline, Microcrystalline and Epitaxial Cubic Silicon Carbide Films

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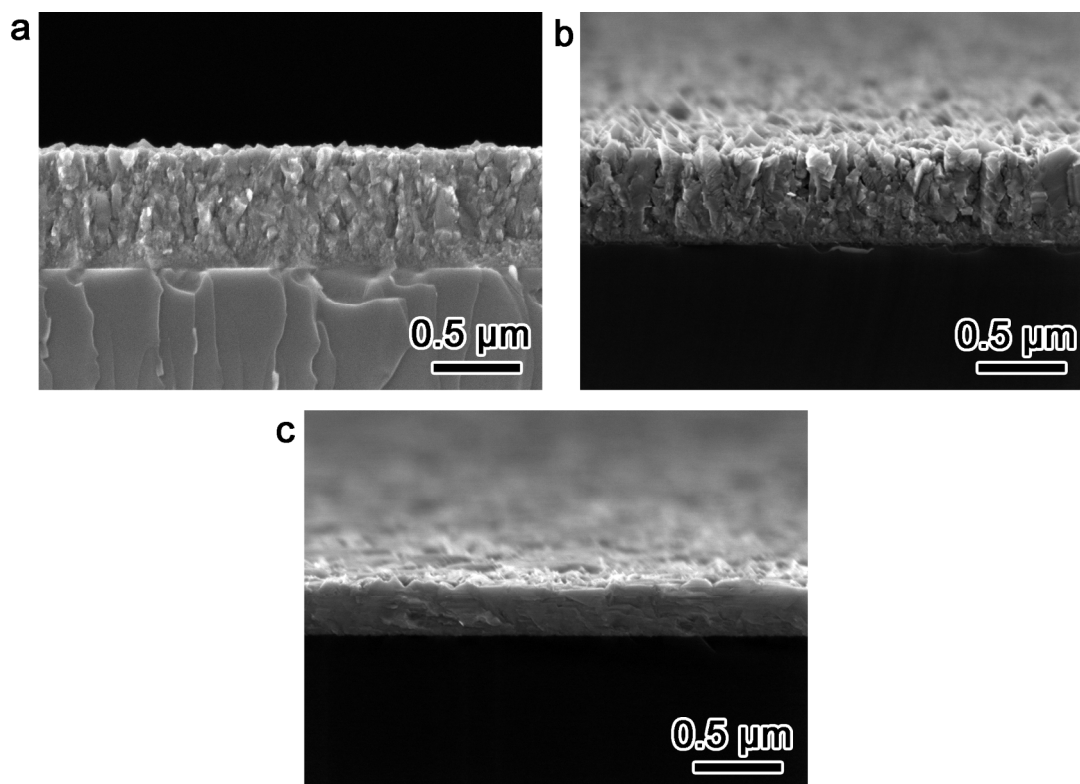


Figure S1. (a) – (c) SEM cross-sectional image of the 3C-SiC films: (a) nanocrystalline; (b) microcrystalline; (c) epitaxial 3C-SiC film.

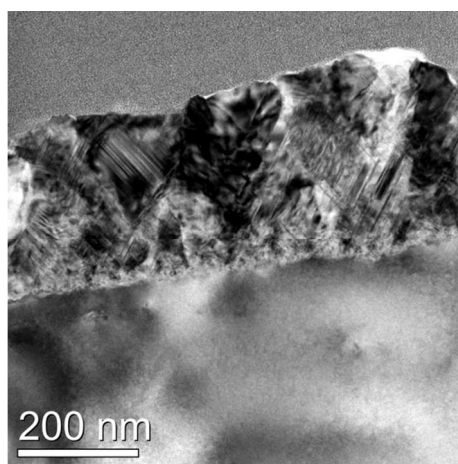


Figure S2. TEM cross-sectional image of the epitaxial 3C-SiC film. No small angle grain boundary is observable indicating the film can be viewed as a single 3C-SiC crystal but with a high density of planar defects.

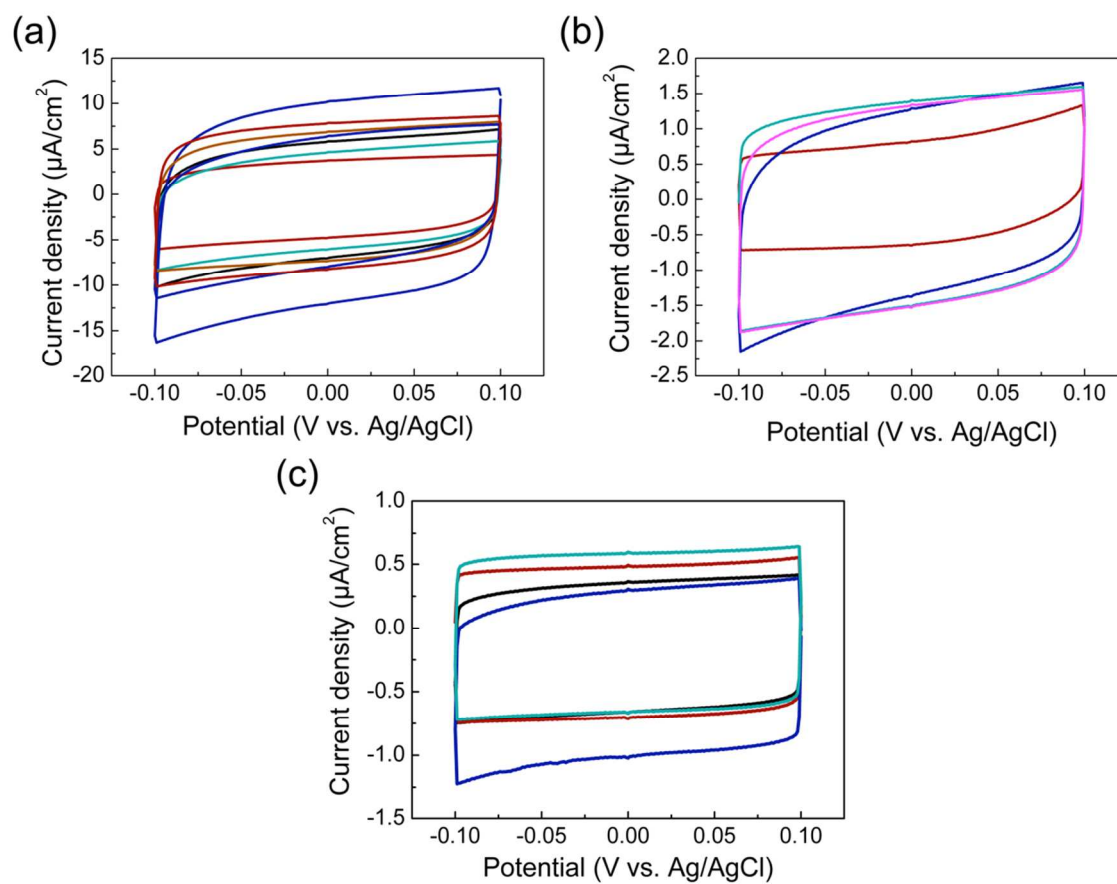


Figure S3. Cyclic voltammetry of 3C-SiC films in 0.1M H₂SO₄, scan rate 100 mV/s: (a) different nanocrystalline 3C-SiC films; (b) different microcrystalline 3C-SiC films; (c) different (001)-oriented SiC films.

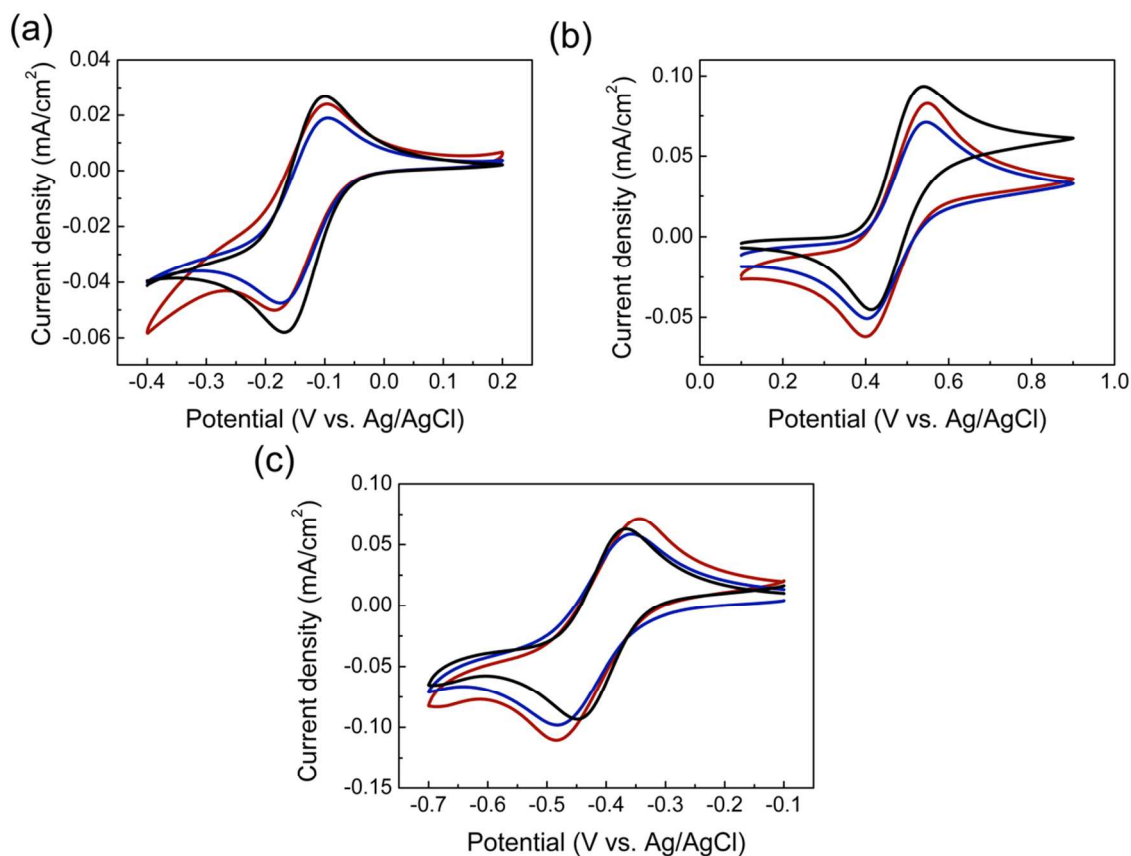


Figure S4. Cyclic voltammetry of 3C-SiC in solutions containing different redox probes: (a) 1 mM [Ru(NH₃)₆]^{2+/3+} in 0.1 M KCl solution; (b) 1 mM ferrocene in 0.1 M TBABF₄ in acetonitrile; (c) 1 mM quinone in 0.1 M TBABF₄ in acetonitrile. Red: nanocrystalline, blue: microcrystalline, black: epitaxial 3C-SiC film.

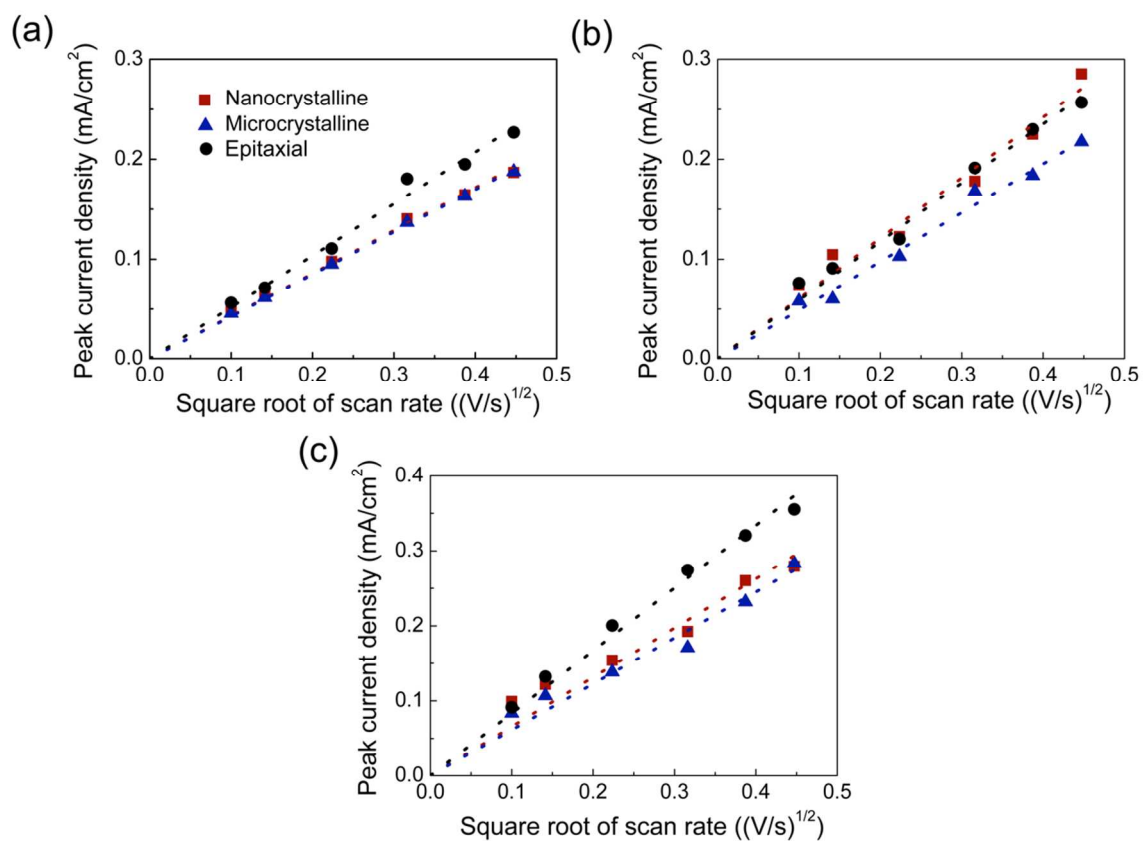


Figure S5. Peak intensity vs. square root of scan rate for different redox probes: (a) 1 mM [Ru(NH₃)₆]^{2+/3+} in 0.1 M KCl solution; (b) 1 mM ferrocene in 0.1 M TBABF₄ in acetonitrile; (c) 1 mM quinone in 0.1 M TBABF₄ in acetonitrile.

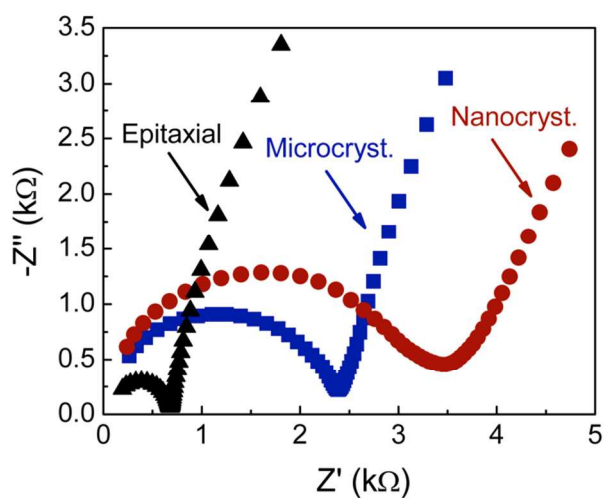


Figure S6. Impedance analysis of the 3C-SiC films in 1mM $[\text{Fe}(\text{CN})_6]^{3-/4-}$ (0.1M KCl as supporting electrolyte) at the 0.1 V within the frequency range of 100 Hz to 1 MHz and the amplitude of 5 mV. The charge transfer resistance is 3353 Ω for the nanocrystalline 3C-SiC film, 2394 Ω for the microcrystalline 3C-SiC film and 581 Ω for (001)-oriented 3C-SiC film.