

Electronic Supplementary information

**Pulsed laser synthesis of diamond-type nanoparticles with enhanced Si-C solid solubility
and special defects**

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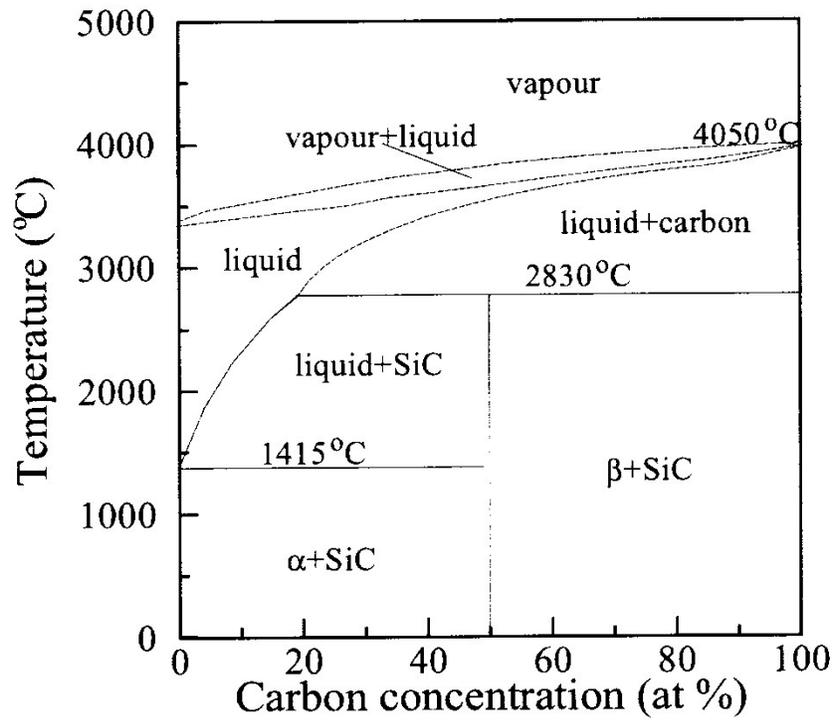
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I-Shou University

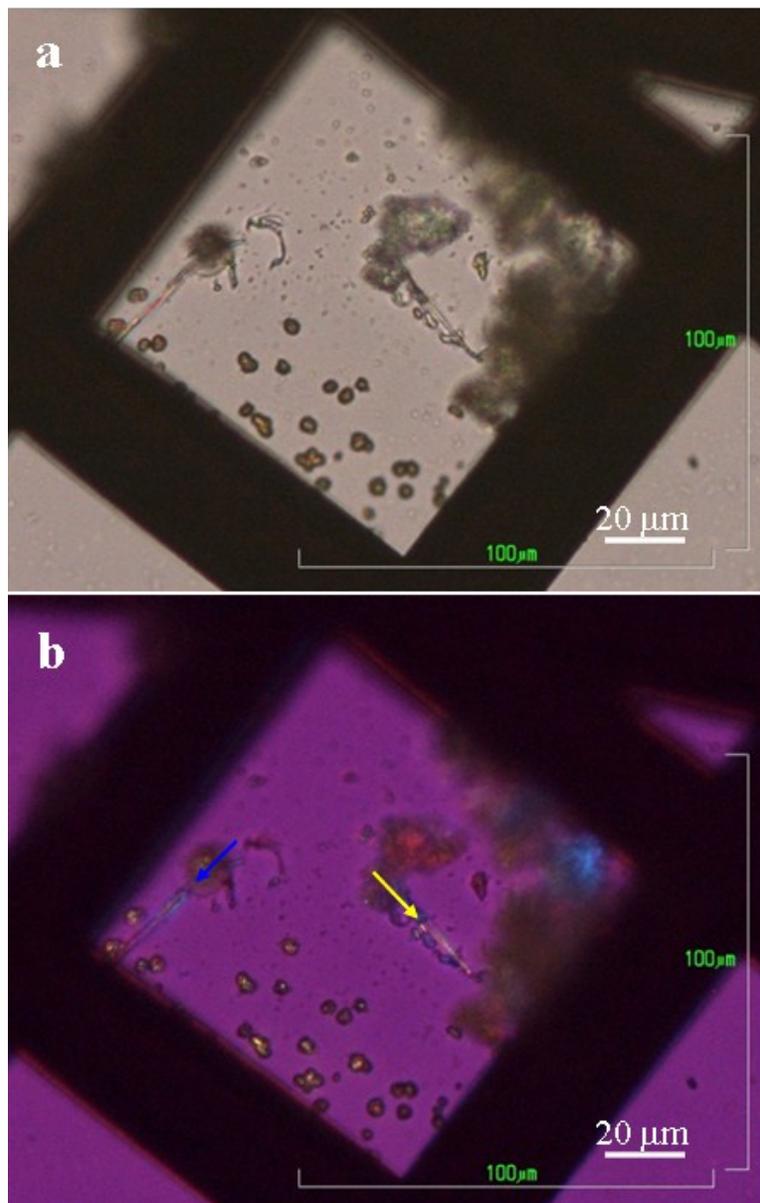
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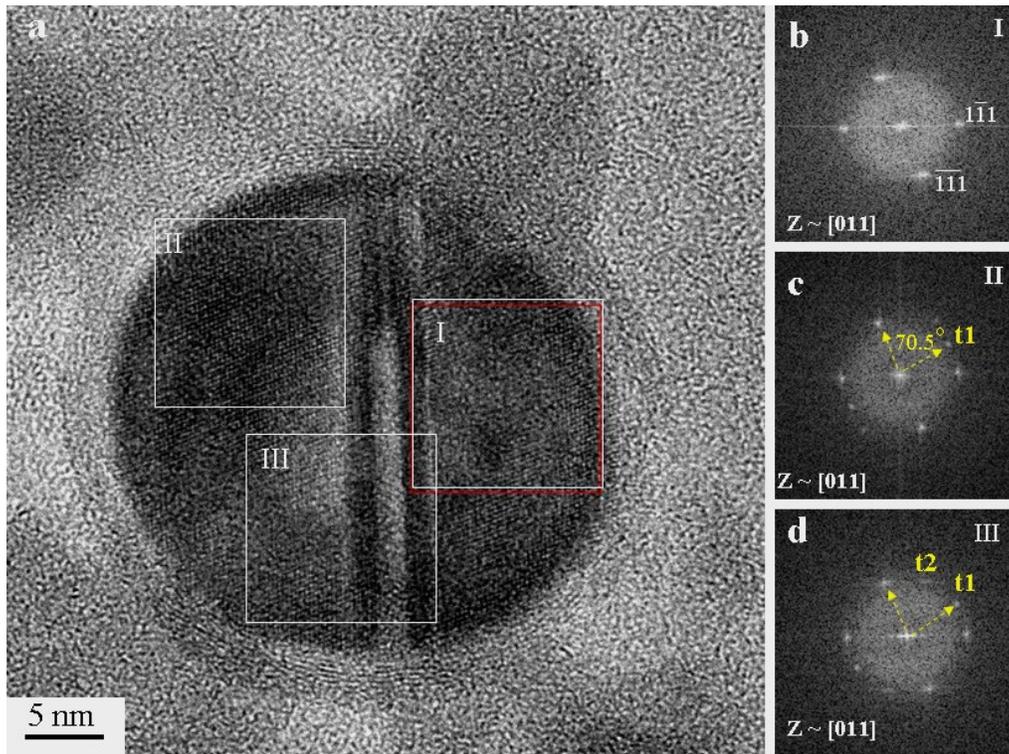
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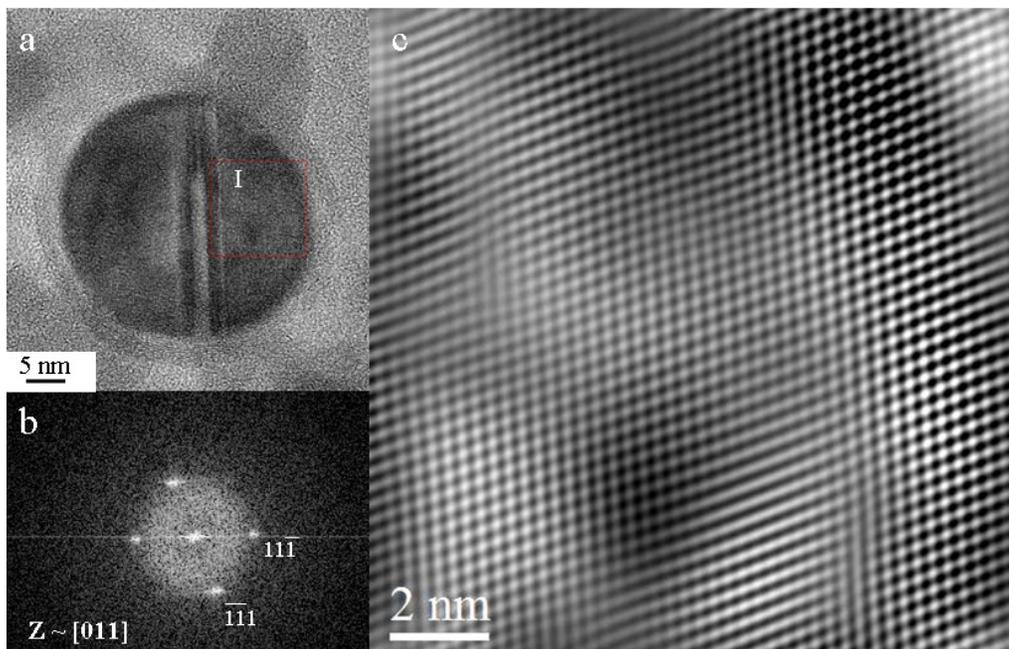
Supplement Figure 1. The phase diagram of the Si-C system after ref.¹



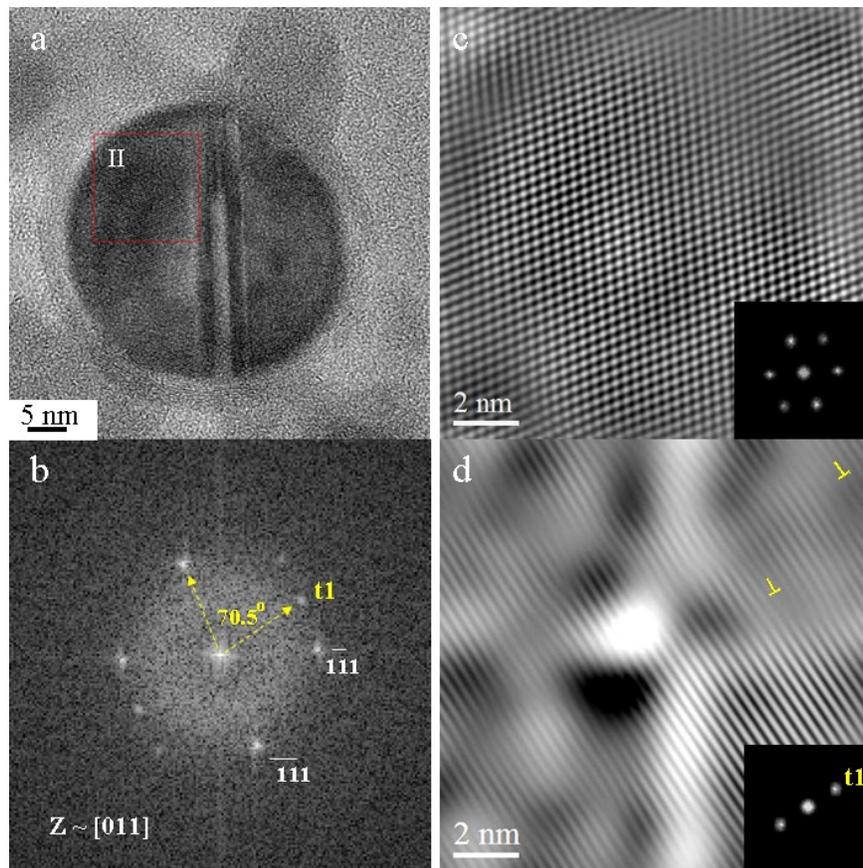
Supplement Figure 2. Optical polarized micrographs of the particulates and condensates (mainly COH-doped Si and minor 3C-SiC, SiOH-doped diamond and graphene) produced by PLA of 6H-SiC in TEOS for 10 min and deposited on copper grid with a C-coated collodion film, taken under (a) open polarizer to show high relief, (b) crossed polarizers with additional λ plate to show length slow (blue and yellow arrows) of the elongated graphene ribbon and significant birefringence of the coalesced and strained particles.



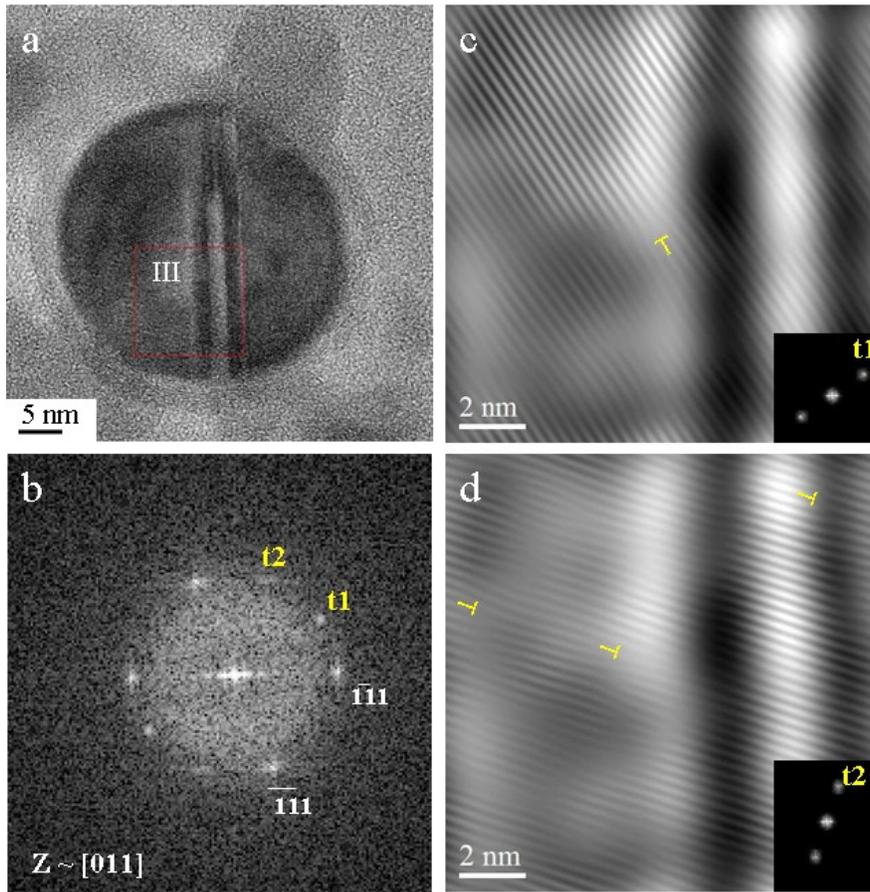
Supplement Figure 3. TEM (a) lattice image and (b)/(c)/(d) forward Fourier transform from the square regions I, II and III, respectively of the C-overdoped Si particulate showing mosaic twin variant t1 in region II and both t1 and t2 variants in region III. (cf. Fig. 5)



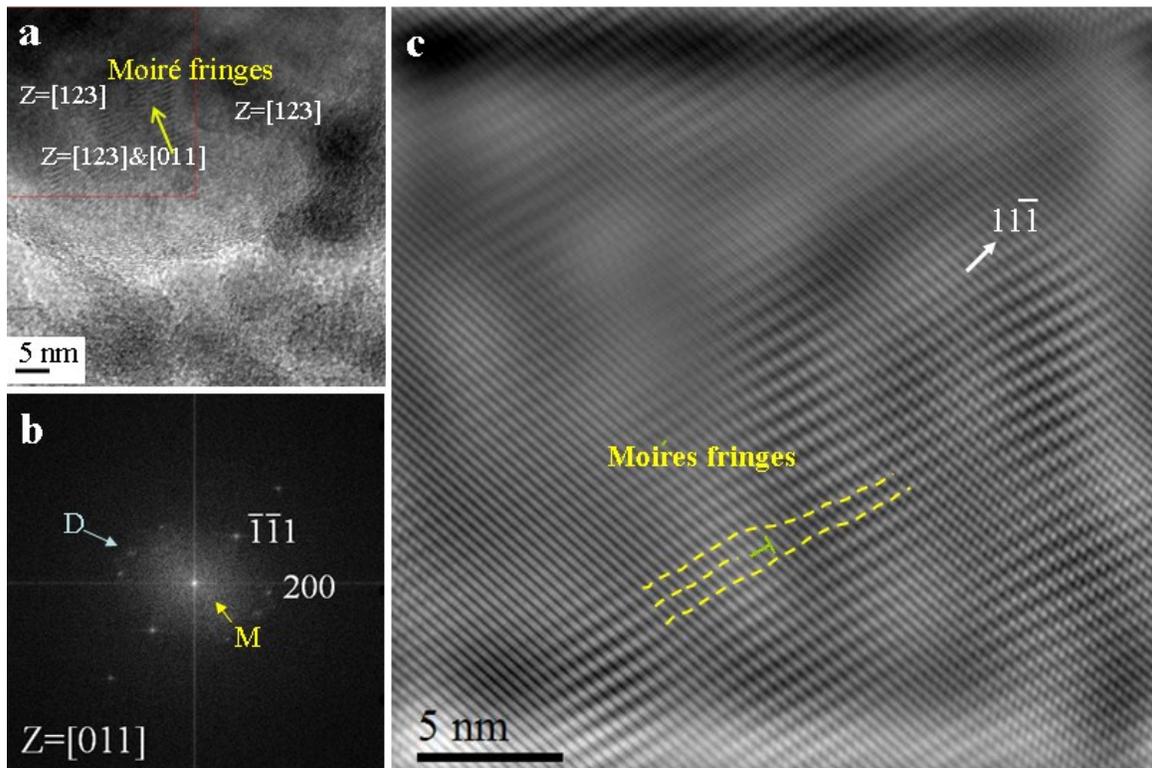
Supplement Figure 4. TEM (a) lattice image and (b)/(c) forward/inverse Fourier transforms from the square region I of the C-overdoped Si particulate free of twin variant and dislocation. (cf. Fig. 5)



Supplement Figure 5. TEM (a) lattice image, (b) forward Fourier transform from the square region II of the C-overdoped Si particulate. (c)/(d) inverse Fourier transform using fundamental reflections and t1 reflections, respectively showing a twin variant is superimposed with the host lattice to give dislocations (T). (cf. Fig. 5)



Supplement Figure 6. TEM (a) lattice image, (b) forward Fourier transform from the square region III of the C-overdoped Si particulate. (c)/(d) inverse Fourier transform using t_1 and t_2 reflections, respectively showing the twin variants are across the $4 \times (1\bar{1}1)$ commensurate faults and superimposed with the host lattice to give dislocations (T). (cf. Fig. 5)



Supplement Figure 7. TEM (a) lattice image and (b)/(c) forward/inverse Fourier transforms from the square region of the Si-overdoped diamond particulate with $[1\bar{1}\bar{1}](011)(123)$ tilt boundary in Fig. 9 showing Moirés (M) fringes and misfit dislocation (T).