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Electronic Supplementary Information

Tuning the radial structure of core-shell silicon carbide nanowires

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Experimental details

Real silicon surfaces can present additional ceramic, metallic or organic contaminations, RCA cleaning procedure is suggested in order to remove them[1]. To remove organic contaminants which are insoluble in polar solvents, a 5:1:1 H_2O:H_2O_2:NH_4OH solution is used to dip the silicon substrate for 20 minutes at 75° C. After a HF treatment the so-formed silicon oxide layer is removed. The following step is the removal of ionic and heavy metal atomic contaminants using a bath, kept at 75°C, of a solution of 6:1:1 H2O:H2O2:HCl for 10 minutes.

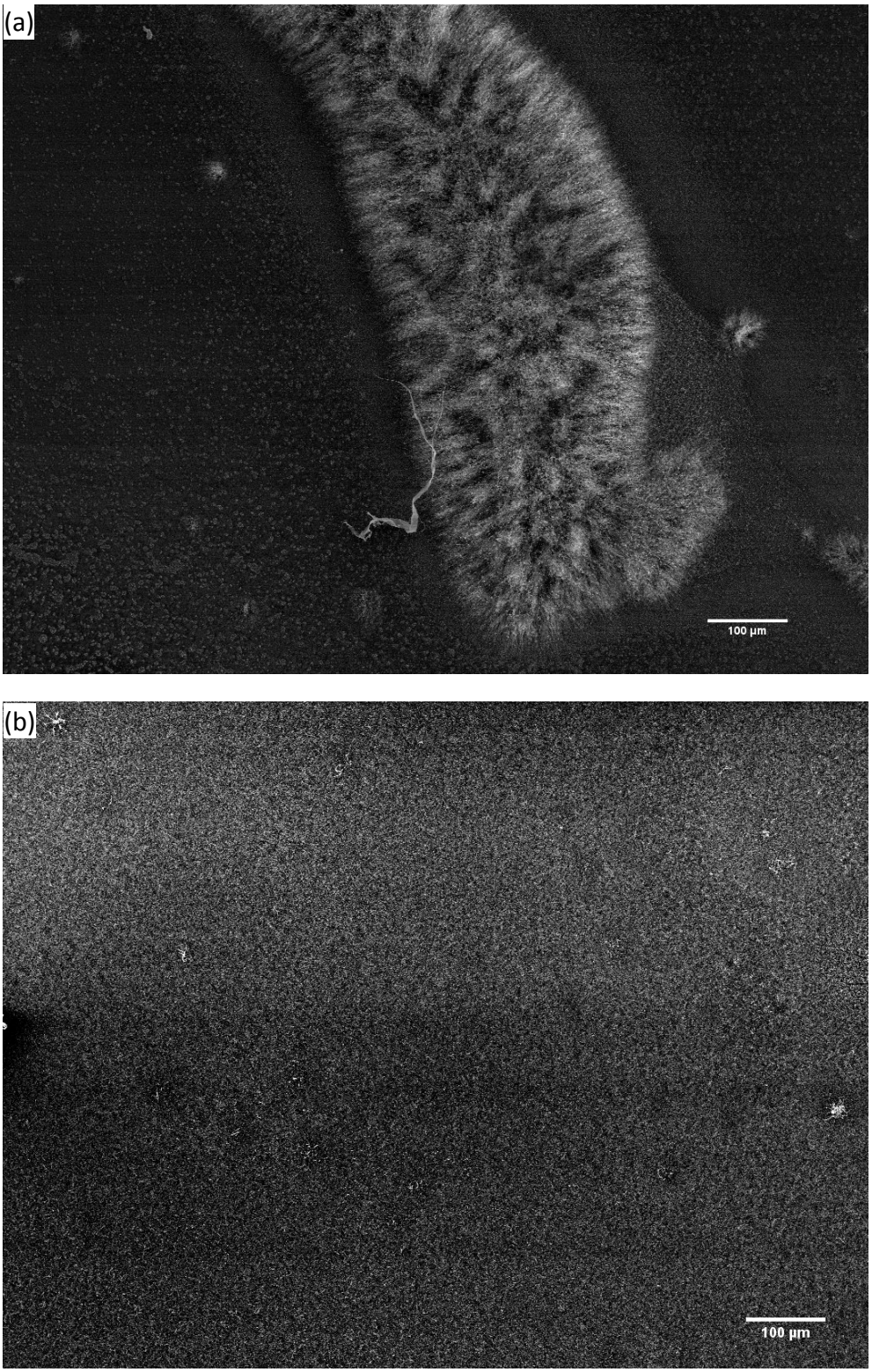

Figure S1: Secondary electrons SEM image of core-shell nanowires sample. It is possible to observe the growth of core-shell nanowires only in the area covered with catalyst. Sample in figure a) was prepared using a catalyst solution without surfactant: the catalyst coverage is non-uniform and the growth occurs only in the circular zone in the lower part of the image. Figure b) shows the result of a nanowires synthesis using a catalyst solution with surfactant: the uniform catalyst layer allow to obtain a homogeneous growth of core-shell nanowires on the entire substrate.

Fig. S2

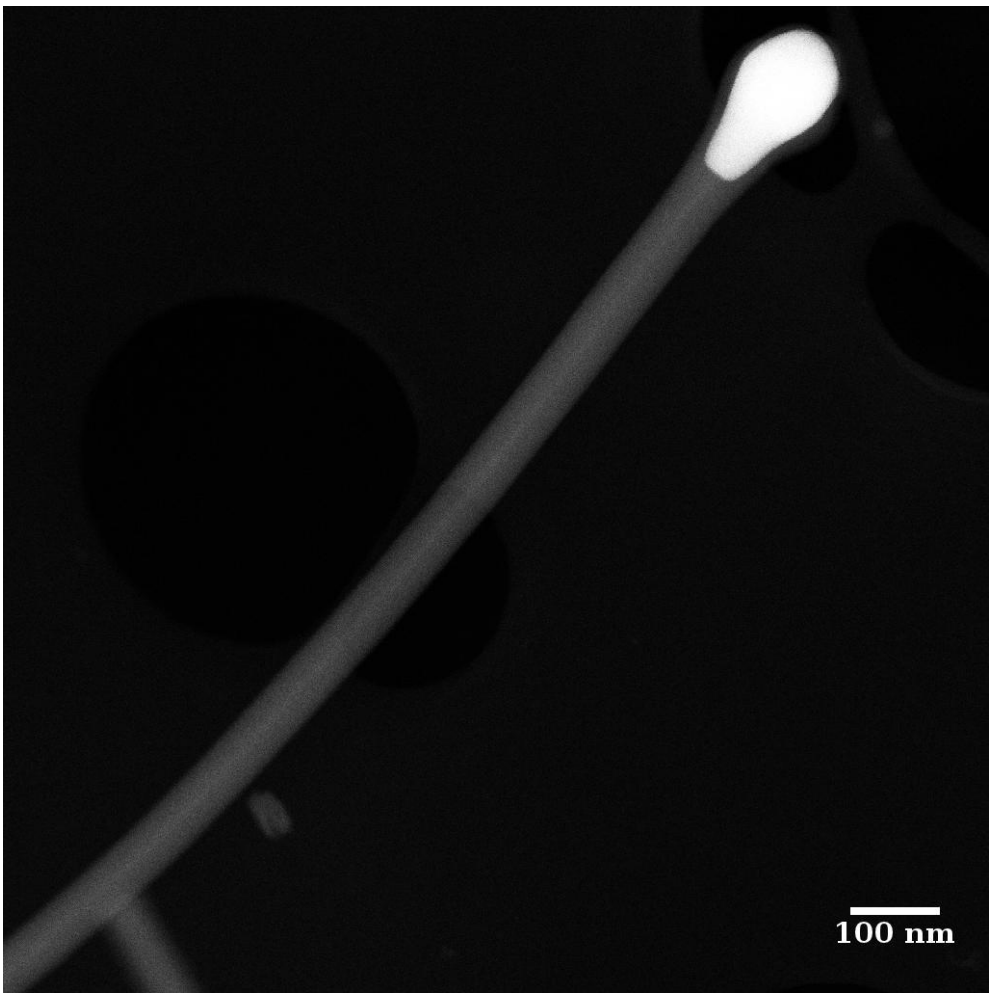

Figure S2: STEM HAADF (High-Angle Annular Dark-Field) image showing the distribution of high Z elements (brighter areas in the image). The presence of iron in the catalyst tip of the nanowires suggests a VLS type growth mechanism for these nanostructures.

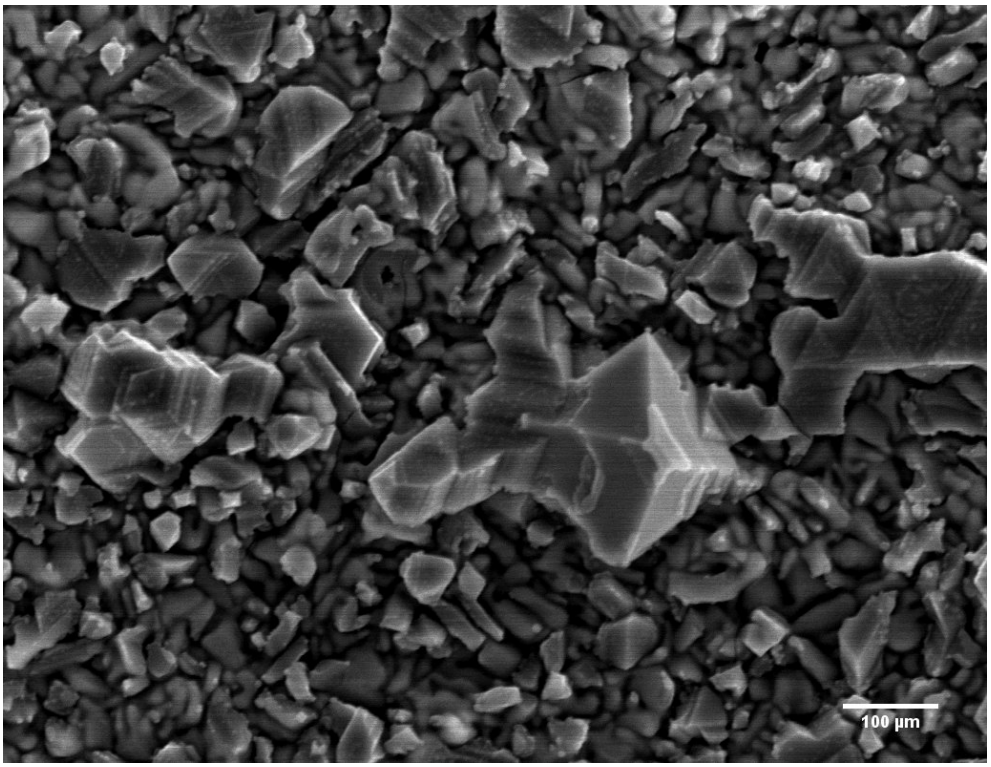

Figure S3: SEM image of the sample synthesized at 1050° C and prepared using $Fe(NO_3)_3$ catalyst. The presence of geometric shapes indicating crystalline structures suggests the formation of the alloy between silicon and iron, but further investigations are needed.

REFERENCES

1. Kern W & Puotinen D A., *RCA Rev.*, 1970, 187–206.