Electronic Supplementary Information

(1) Raw materials details:

The molecular weight of high hydrogen containing polysiloxane(HPSO) is about 2000; the ethylenediamine(EDA) is analytically pure; the purity of Al powders is 99.9% and particle size of Al powders is 1um.

(3) More details about SiONCH sol-gel structure:

FT- IR spectrum (Figure S1) of SiONCH sol-gel shows that the products mainly contain Si-O-Si and Si-C bond. Because Si-base compound has strong FT-IR absorb effect, the characteristic absorption peaks of Si-O-Si(1100cm^{-1}) and Si-C(1275cm^{-1}) are much strong than hydrocarbon and some peaks of C-N (1120cm^{-1}) are covered. The peak (2970 cm^{-1}) indicates the C-H structure of methyl. The peak (2100cm^{-1}) indicates the Si-H structure which is residual bond of HPSO is still existed in SiONCH sol-gel. The characteristic absorption peak of Si-N bond (873cm^{-1}) indicates the reactions are mainly dehydrocoupling of Si–H and N–H units resulting in the formation of SiONCH structure. This result can be further confirmed by mensurating H_2 yield.

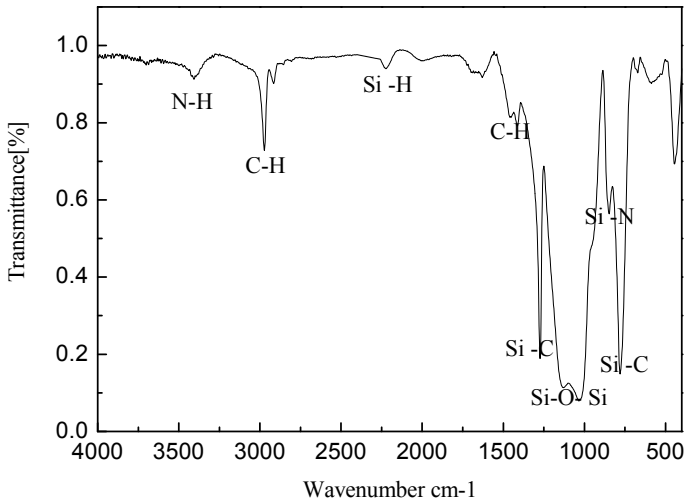
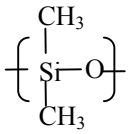


Figure S1. FT- IR spectrum of SiONCH sol-gel

More structure details can be characterized by XPS spectra of N1s and Si2p of SiONCH sol-gel. As Figure S2 shown the N1s bonding energy peak can be separated to 398.1ev and 399.1ev which are indexed to the Si-N bond and -CH_2-NH_2- bond respectively. Further studies of the Si2p bonding energy peak indicate that the bond energies of 100.8ev, 103.1ev and 101.9ev are indexed to the Si:(N_xH_y), -O-Si-O- and



structures respectively. The results can confirm that SiONCH sol-gel mainly contain Si-O-Si and Si-C structures. The reaction can be indexed to the dehydrocoupling of Si–H and N–H units.

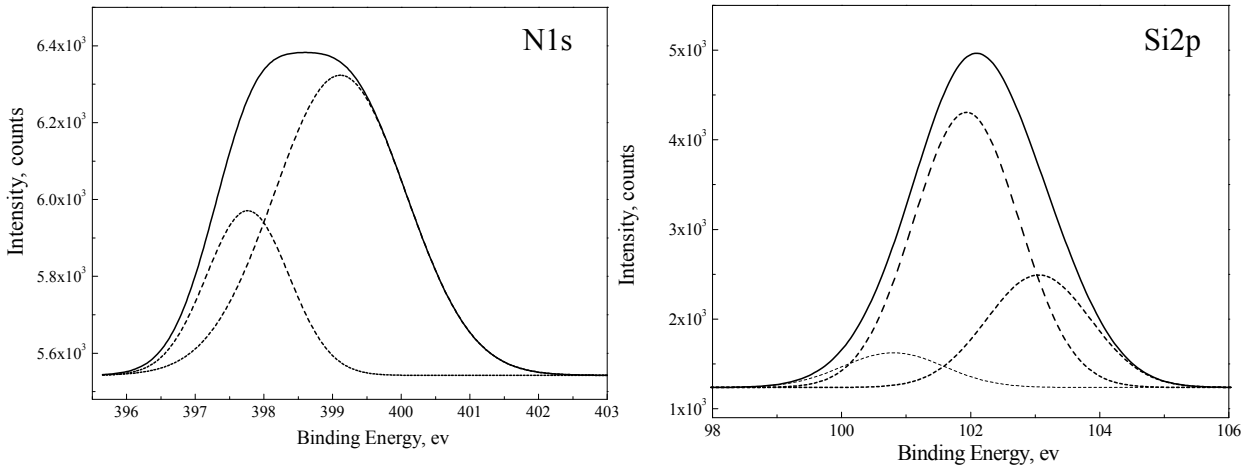


Figure S2. XPS spectra of N1s and Si2p of SiONCH sol-gel

(3) As shown in figure S3, the length of the Sialon nanobelts can be measured by drawing the entangled wool products till to a single nanobelt exposing. The total length is above 12mm.

Figure S3. Photograph of the β-Si_5AlON_7 nanobelts thermal treated at 1450°C for 2 hours

(4) In the pyrolysis processe, decomposition and rearrangement reactions can cause raw materials to product nano scale nucleus. As the figure S4 shown, the morphology of SiONCH-Al annulus debris thermal treated at 1000°C for 2 hours is mainly SiAlONC amorphous with slight crystallization of SiC . Further studies suggest that the particle size and C/Si ratio of SiONCH-Al structure contribute to the nucleation of Si_3N_4. The nucleation temperature can decrease significantly with decreasing particle size in starting powders as well as with increasing surface area of nano scale SiC. The C/Si ratio of SiONCH-Al structure is 2 that provide the possibility of forming Si_3N_4. If the C/Si ratio is less than 3, the reaction (2) can be possible at temperature below 1500°C.

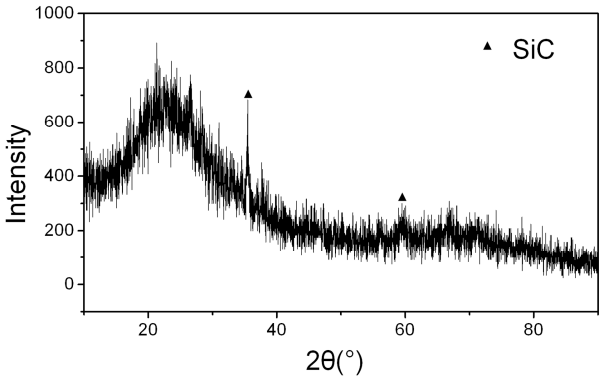


Figure S4 XRD pattern recorded from SiONCH-Al annulus debris thermal treated at 1000° C for 2 hours