Supporting Information

High-Strength Carbon Nanotube/Carbon Composite Fibers by Chemical Vapor Infiltration

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1. Pressure equilibrium constants of decomposition of various hydrocarbons

Fig S1. Pressure equilibrium constants of various chemical reactions with respect to temperature.¹
2. Calculation of Reynolds number

When the flow rate was 3700 cm³, the Reynolds number is

\[
\text{Reynolds number in the tube} = \frac{\rho vd}{\mu} = \frac{vd}{\nu} = \frac{Qd}{Av} = \frac{3700 \text{ cm}^3\text{ min}^{-1} \times 10^{-6} \text{ m}^3\text{ cm}^{-3} \times \frac{1}{60} \text{ min}^{-1}}{117.8 \times 10^{-6} \text{ m}^2\text{ s}^{-1} \times \pi \times (3 \times 10^{-2} \text{ m})^2} = 11
\]

Where \(\rho\) is the density of the gas, \(v\) is the flow velocity, \(d\) is the diameter of the tube, \(\mu\) is the viscosity of the gas, \(\nu\) is the kinematic viscosity, \(Q\) is the flow rate, and \(A\) is the cross-sectional area of the tube.
3. Cross sections of CNT/C composite fibers

Fig. S2. Cross-sectional SEM images of (a)-(b) pristine CNT yarn, CNT yarn after CVI process (c)-(d) at 700 °C for 1 hour, (e)-(f) at 700 °C for 5 hours, (g)-(h) at 650 °C for 5 hours, and (i)-(j) at 750 °C for 5 hours
Reference