Supplementary information

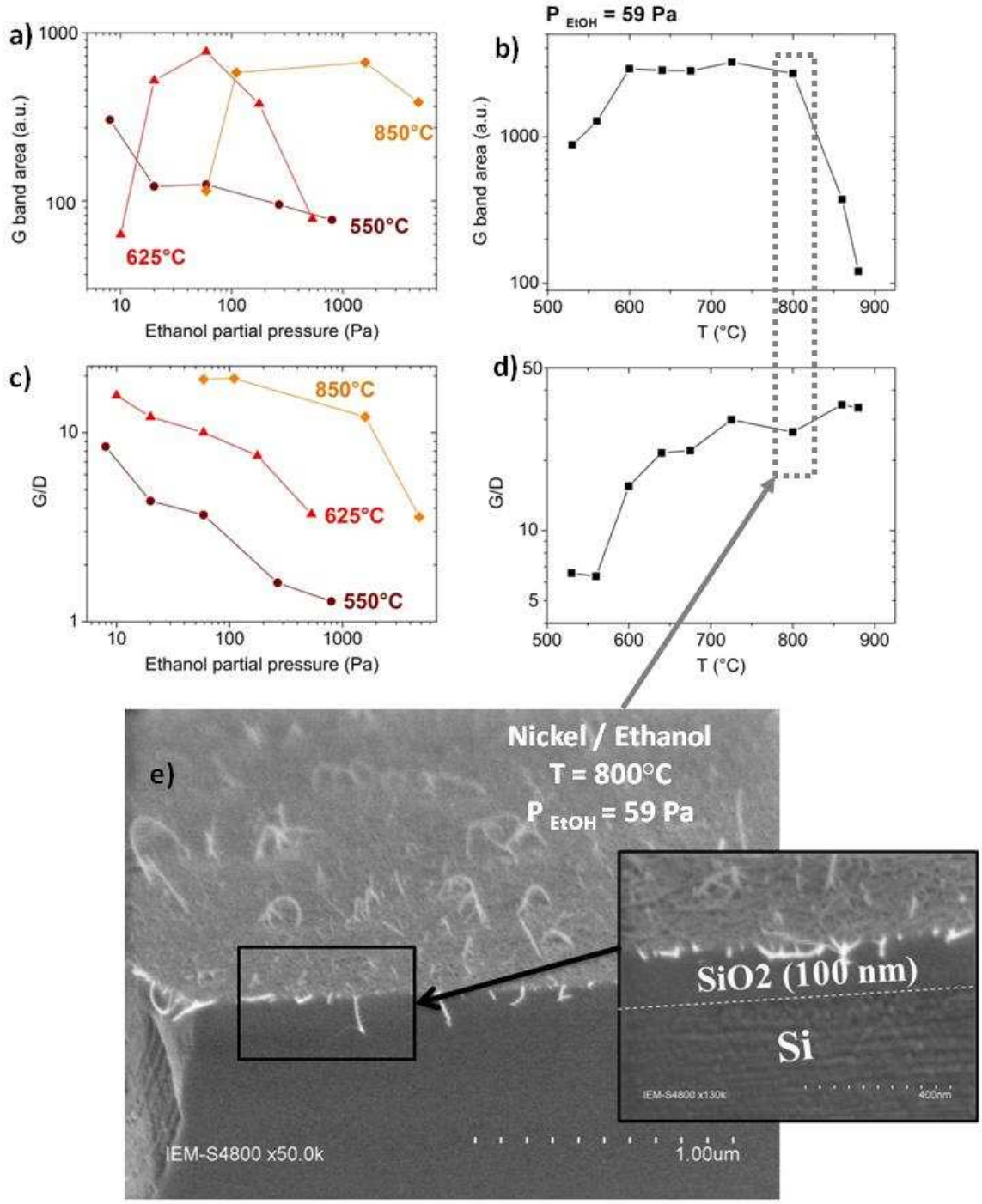

Figure S1. *Evolutions of the final G band area as a function of ethanol partial pressure (a) and temperature (b). Evolution of the G/D intensity ratio as a function of ethanol partial pressure (c) and temperature (d). The G and D bands were measured at room temperature, with a wavelength of 532nm. e) Representative SEM pictures showing a typical sample grown at T = 800°C and* P_{EtOH}*=59 Pa.*

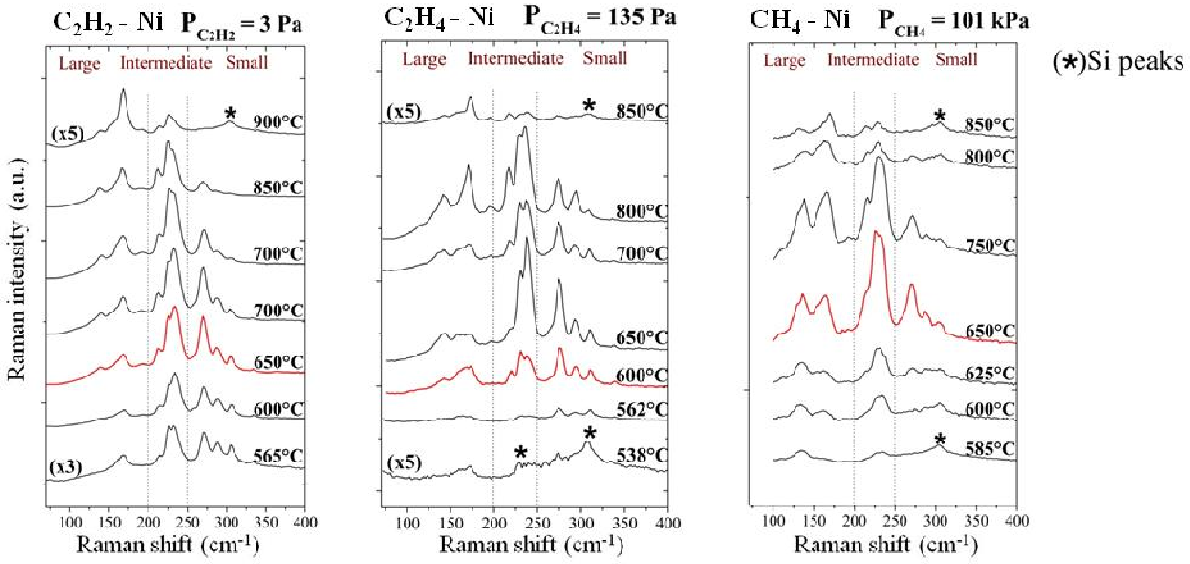

Figure S2. *Evolution of the RBM spectra as a function of synthesis temperature for acetylene, ethylene and methane combined with nickel. The red curves correspond to the highest proportion of small diameter nanotubes.*

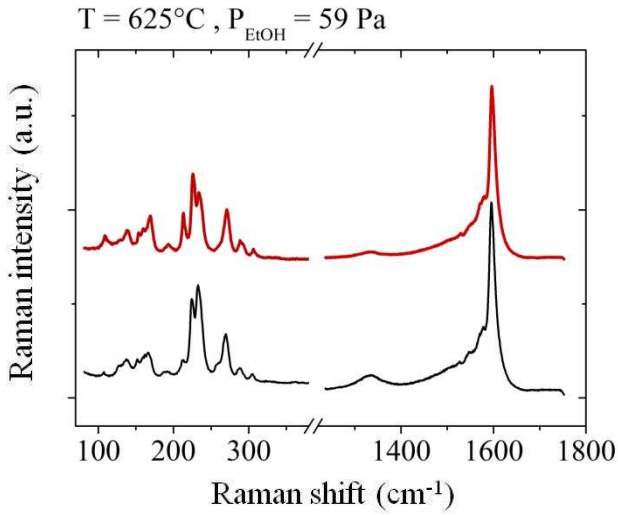

Figure S3. *Raman spectra obtained for two successive growths separated by an oxidative step. The black line corresponds to a first synthesis at 625°C and ethanol partial pressure of 59 Pa. The red line corresponds to a second growth performed on the same sample in the same synthesis conditions after an oxidative treatment at 700 °C under pure O2 at atmospheric pressure and during 5 min. The two spectra were recorded at the same position.*

The two spectra exhibit very similar RBM profiles. This experiment demonstrates that the oxidative step causes a negligible lowering of the synthesis yield (less than 20%) and does not significantly modify the diameter distribution of SWNT.

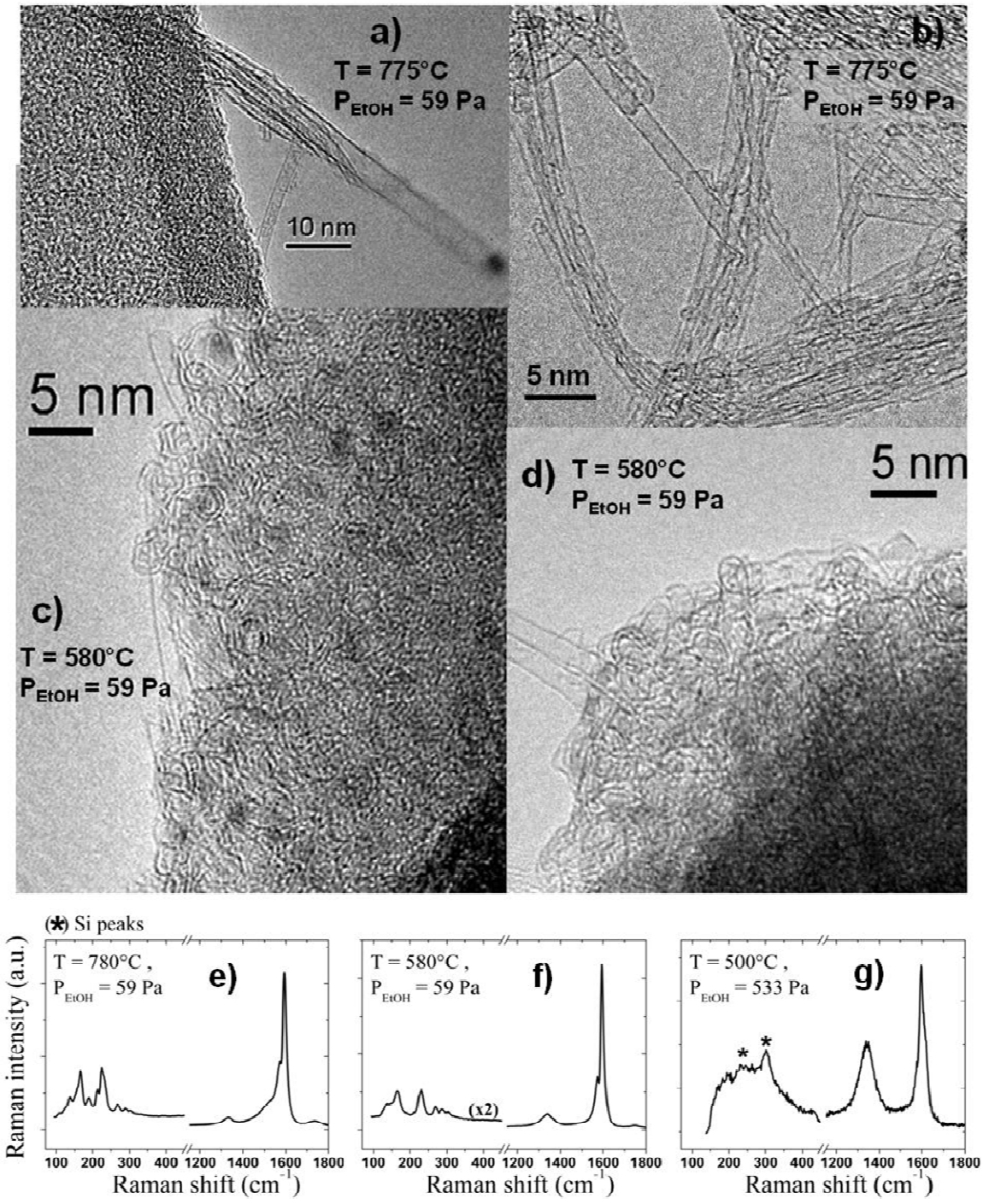

Figure S4. *Typical HRTEM for samples prepared at high (a-b) and low (c-d) temperatures, respectively. e-f-g) Typical Raman Spectrum for samples prepared at high (780°C), low (580°C) and very low temperature (500°C), respectively (excitation line at 532 nm).*

Catalyst nanoparticles are embedded in disordered carbon envelopes for synthesis at low temperature and high precursor pressure. The G/D ratio of these samples is much lower at low temperature. At very low temperature and high ethanol partial pressure (T = 500°C,

P_{EtOH} = 533 Pa), the RBM peaks are weak and ill-resolved, the intensity of the G and D bands are of the same order of magnitude and the G band is broad without any well-resolved G-component. This confirms that the grown carbon nanostructures are very defective in the low temperature – high precursor partial pressure synthesis conditions.