Supplementary information for

Low temperature synthesis of graphite on Ni films using inductively coupled plasma enhanced CVD

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Supplementary materials:

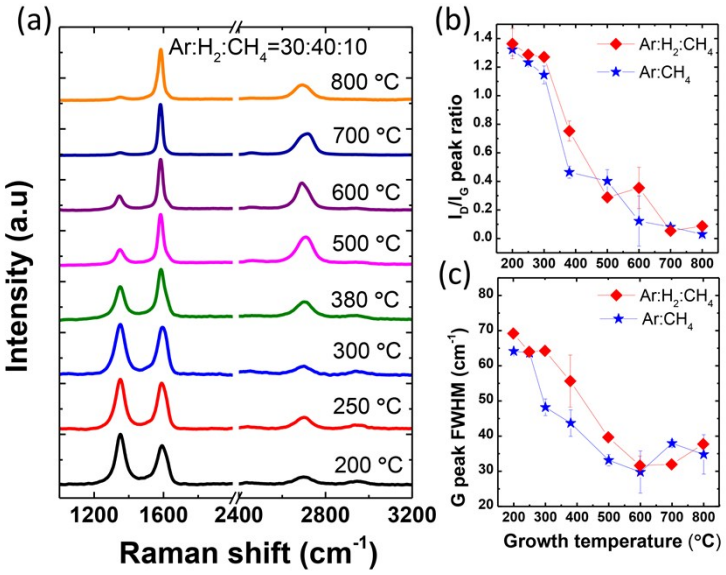

Fig. S1 - Temperature dependent Raman spectra of graphite films on polycrystalline Ni surface at plasma power of 50 W for 300 s using the $Ar:H_2:CH_4$(40:30:10) gas mixture, (b) corresponding intensity ratios of D and 2D to G band, (c) FWHM of G band in reference to that of samples prepared using hydrogen-free ($Ar:CH_4$ =70:10) gas.

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Fig. S1 shows the Raman characteristics of graphitic films on Ni as a functional of temperature using Ar-H_2-CH_4, a hydrogen-rich gas source, at a plasma excitation power of 50 W and growth time of 300 s. Fig. S1- (a) is the evolution of Raman spectra for graphitic films grown from 200 to 800 °C, showing a continuous decrease of D band intensity and increase of G bond intensity. This temperature dependent Raman spectra of these samples demonstrate a similar trend as films grown without hydrogen, however, the related intensity ratios of D to G band, I_D/I_G, and the FWHM of G band are slightly higher, as shown in Figure S1 (b)-(c). From the Raman, it is suggested that the etching effect of hydrogen radicals is not obvious at temperatures above 600 °C whereof the graphitic film growth mechanism is dominated by segregation and precipitation mechanism.

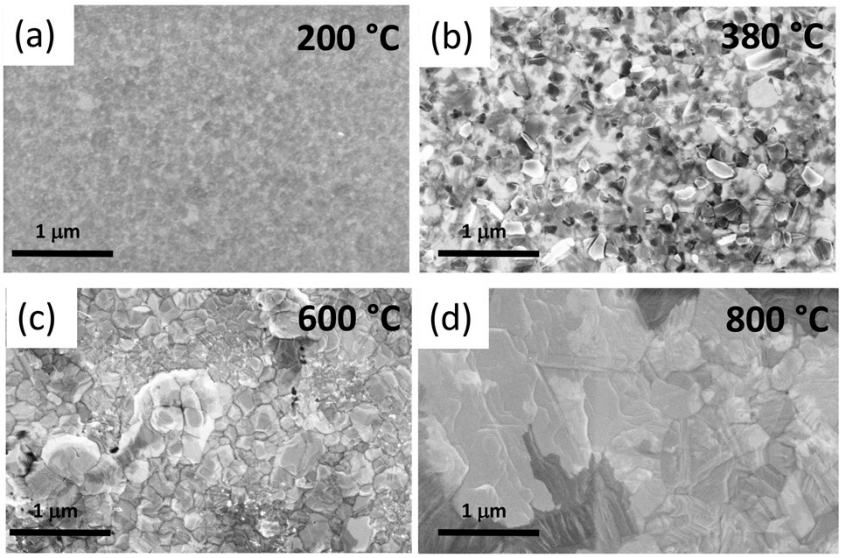

Fig. S2 - (a)-(d) SEM images of graphite films grown on polycrystalline Ni surface at 200, 380, 600 and 800 °C, respectively using Ar-CH_4 gas sources at plasma power of 50 W for 300 s.

Fig. S2 are the SEM images of graphitic film grown on polycrystalline Ni surface at 200, 380, 600, and 800 °C showing the morphology changes of the graphite films at different growth temperature. At 200 °C, there is no identification of large graphitic flakes visible but the changes of Ni surface contrast in comparison to that of clean polycrystalline Ni substrate, which is constant with the formation of polycrystalline graphitic structures as is

expected for low temperature deposition. Some graphitic flakes, up to 200 nm, are observed apparently at 380 °C, however, the density of these graphitic flakes are low in comparison to those samples grown at 600 °C. Eventually, high quality of graphitic films, as determined from corresponding Raman spectra, are formed at 800 °C. These SEM images suggest that the original morphology of polycrystalline Ni may not have large effect on the quality of graphitic films grown on different temperatures.

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