Supporting Information

Partial Pressure Assisted Growth of Single-Layer Graphene Grown by Low-Pressure Chemical Vapor Deposition: Implications for High-Performance Graphene FET Devices

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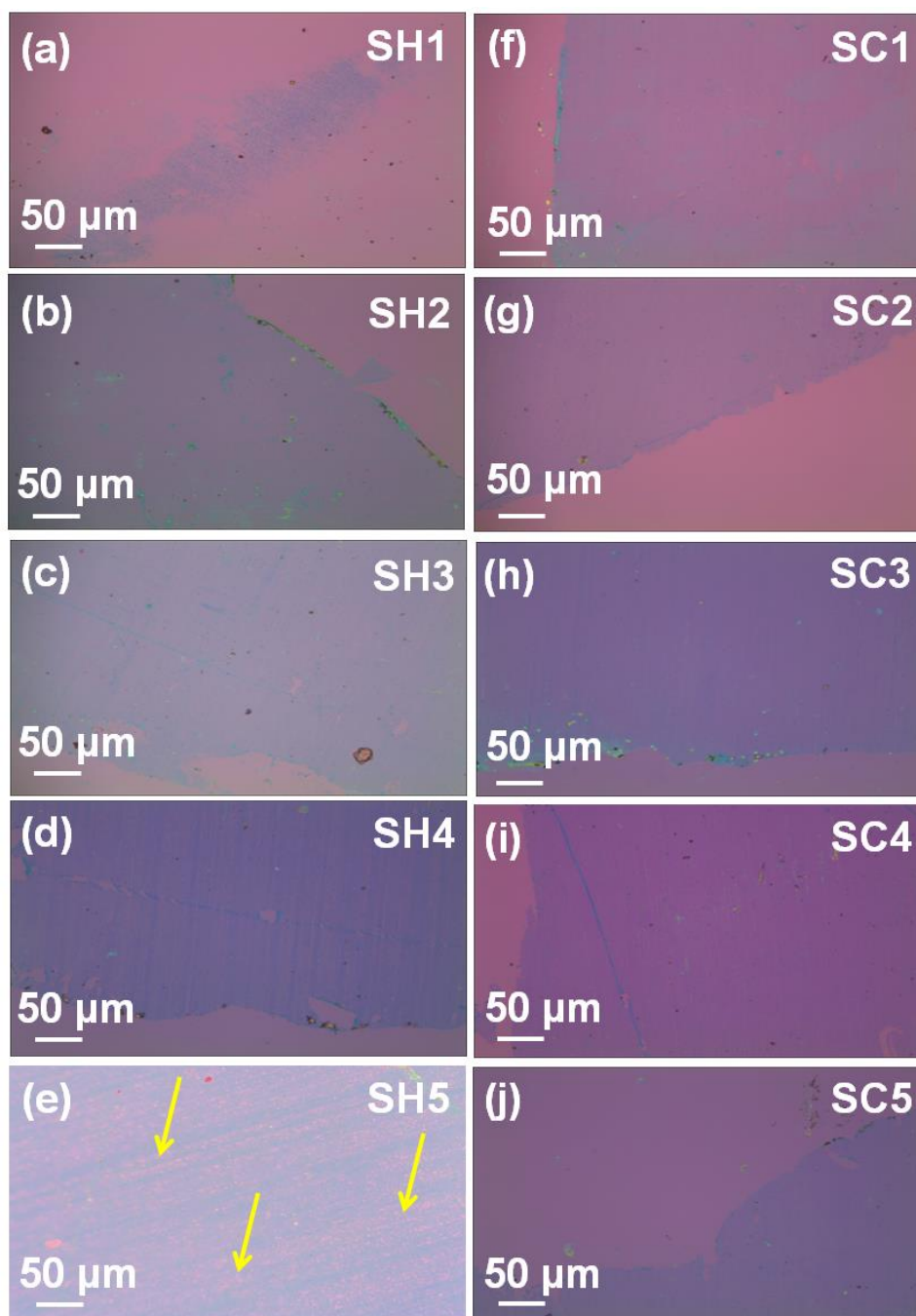*E-mail: Indu Sharma: indusharma.86@gmail.com

Figure S1. Optical images of graphene on Si/SiO$_2$ at different (a-e) hydrogen partial pressure (SH1-SH5), and (f-j) and methane partial pressure (SC1-SC5) (resolution 20×).
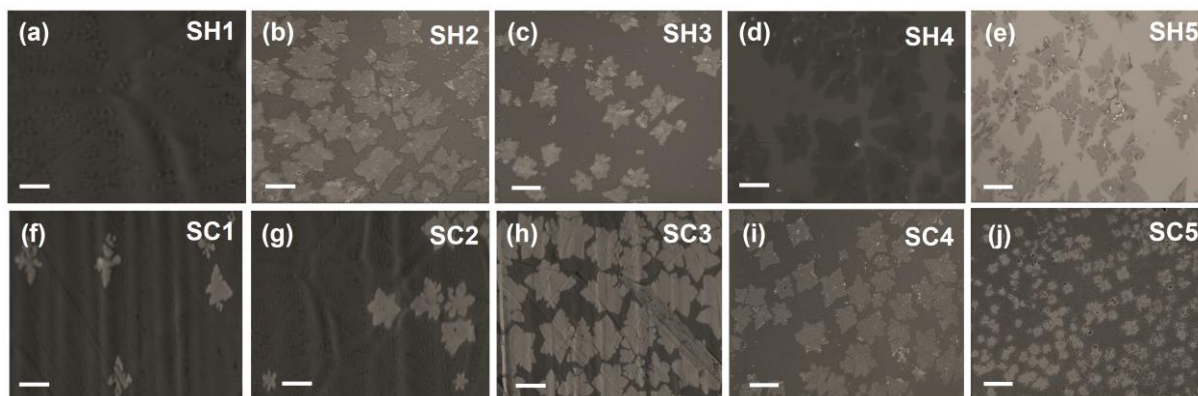
Figure S2. SEM images of graphene on Si/SiO$_2$ at different (a-e) hydrogen partial pressure (SH1-SH5), and (f-j) and methane partial pressure (SC1-SC5) Scale bars are 50 µm.

Table S1. Nucleation density of graphene at different hydrogen partial pressures (SH1-SH5) and methane partial pressure (SC1-SC5).

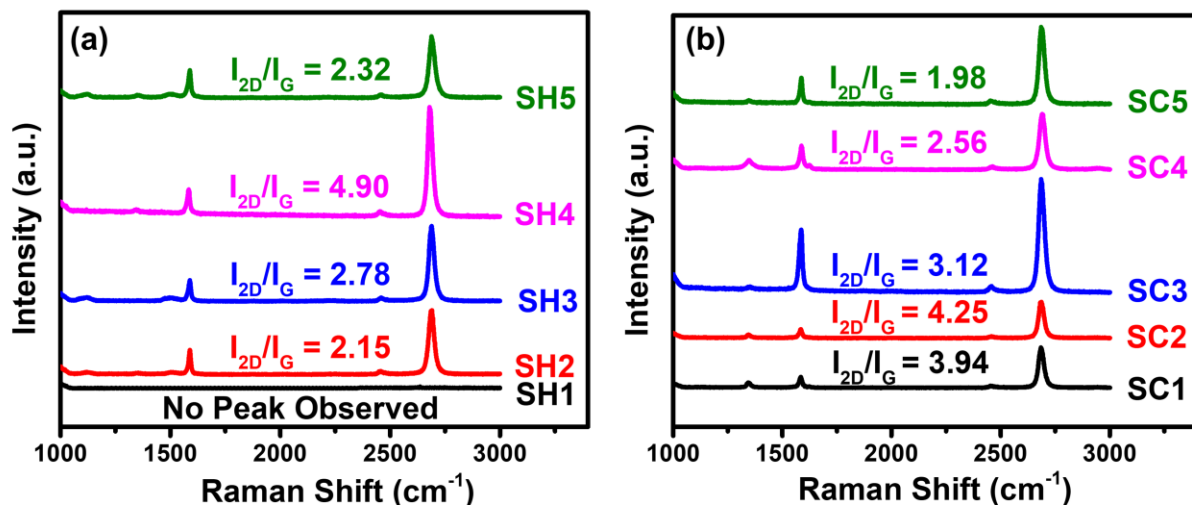| Sample	Estimated Nucleation density ×10^2 (nuclei cm^{-2})	Sample	Estimated Nucleation density ×10^2 (nuclei cm^{-2})
SH1	0	SC1	~ 49
SH2	~ 237	SC2	~ 115
SH3	~ 171	SC3	~ 253
SH4	~ 122	SC4	~ 310
SH5	~ 147	SC5	~ 816

Figure S3. Raman spectra of CVD graphene grains after transfer on Si/SiO$_2$ substrate at different (a) hydrogen partial pressure (SH1-SH5), and (b) methane partial pressure (SC1-SC5).

Table S2. Comparative Raman data analysis of graphene grains at different hydrogen partial pressures (SH1-SH5) and methane partial pressure (SC1-SC5).

	P(H$_2$) (Torr)					P(CH$_4$) (Torr)			
Sample	Position	I$_{2D}$/I$_G$	2D (FWHM)	I$_D$/I$_G$	Sample	Position	I$_{2D}$/I$_G$	2D (FWHM)	I$_D$/I$_G$
SH1	----	----	----	----	SC1	G ~1584 2D ~2685	~ 3.94	~ 30	~ 0.2
SH2	G ~1587 2D ~2688	~ 2.15	~31	~0.1	SC2	G ~1585 2D ~2686	~ 4.25	~27	----
SH3	G ~1588 2D ~2687	~ 2.78	~31	~ 0.4	SC3	G ~1586 2D ~2688	~ 3.12	~ 31	< 0.1
SH4	G ~1583 2D ~2682	~ 4.90	~ 27	~ 0.1	SC4	G ~1587 2D ~2690	~ 2.56	~ 33	~ 0.3
SH5	G ~1587 2D ~2690	~ 2.32	~ 33	~ 0.1	SC5	G ~1584 2D ~2687	~ 1.98	~ 33	~ 0.1