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PAPER

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Supplementary information

Direct synthesis of graphene from adsorbed organic solvent molecules over copper

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† Electronic Supplementary Information (ESI) available: [SEM on Cu and transferred on SiOx/Si, thermodynamic calculation, SEM line profile, stats for pressure and flow effect]. See DOI: 10.1039/x0xx00000x

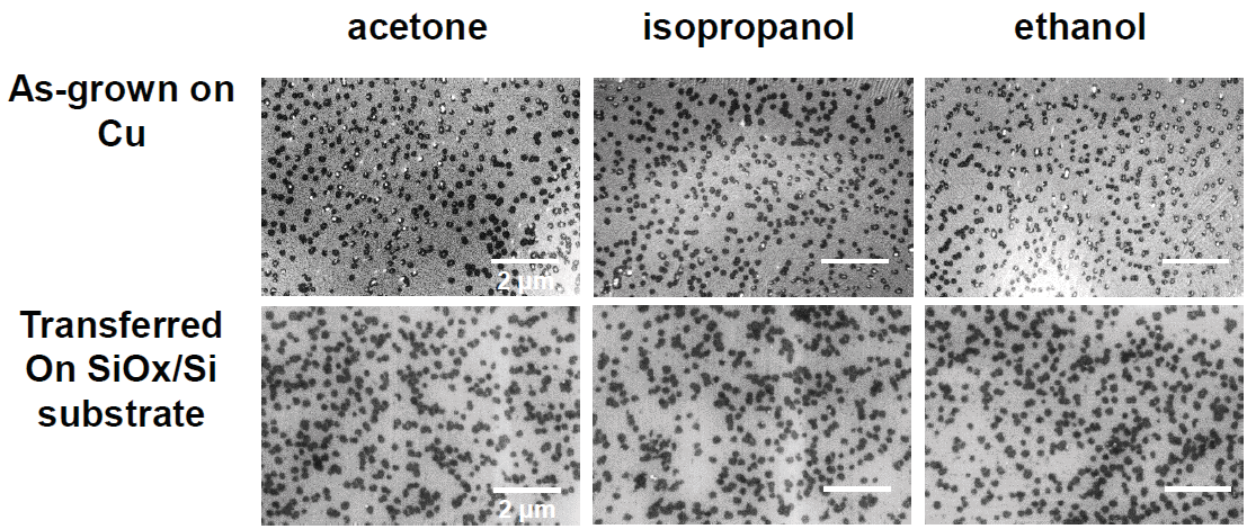

Fig. S1 Representative graphene flake formation over Cu (top row) and after transfer on to Si/SiO_2 wafers (Synthesis parameters: temperature =900^{o}C, pressure =10 mbar, flow =16 sccm)

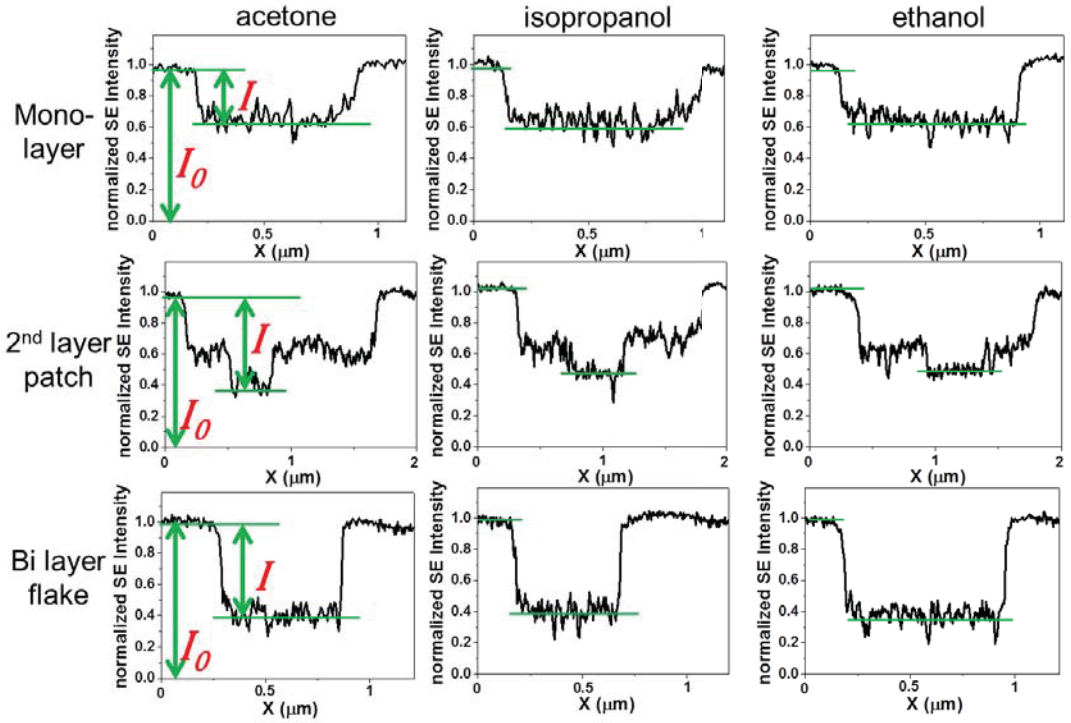

Fig. S2 Relative contrast measurements from flakes shown in SEM micrographs from Fig. 2 in the main text (using Gwyddion software) for all three investigated organic solvents.

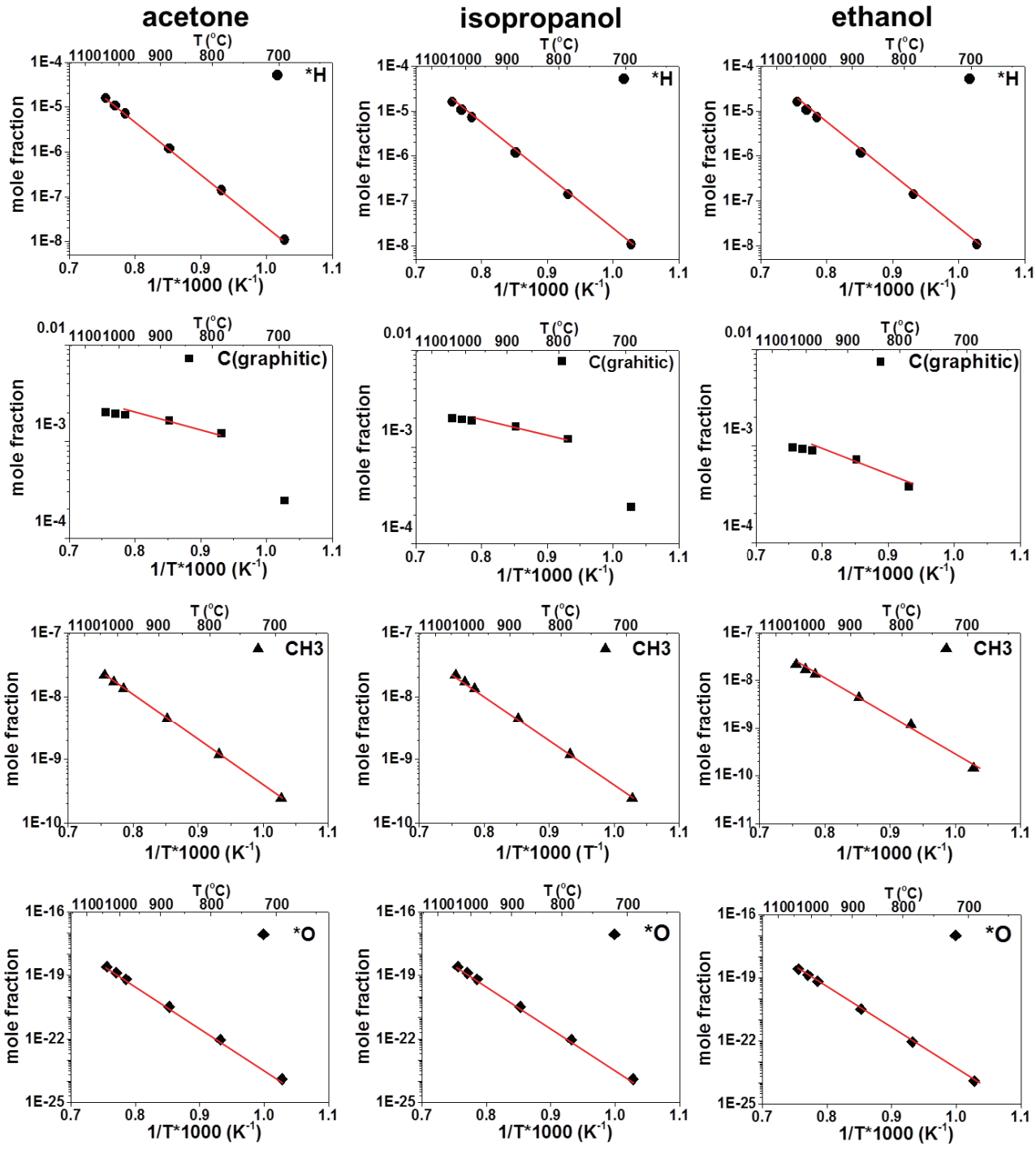

Fig. S3 Thermodynamic calculations data showing the relative mole fractions for the three main radicals produced in the reaction (H* - top row), (graphitic carbon – first middle row), (CH_3 – second middle row) and (O* - bottom row).

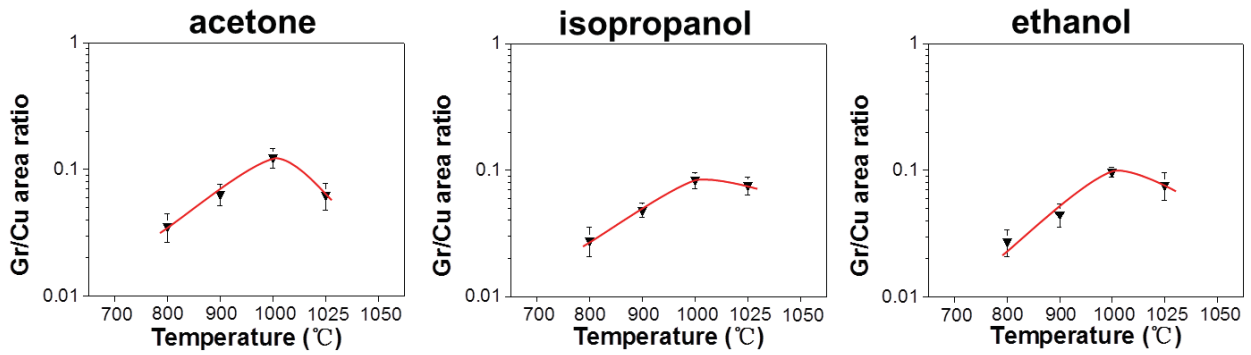

Fig. S4 Graphene area to Cu substrate area ratios for adsorbed acetone, isopropanol and ethanol (left to right)

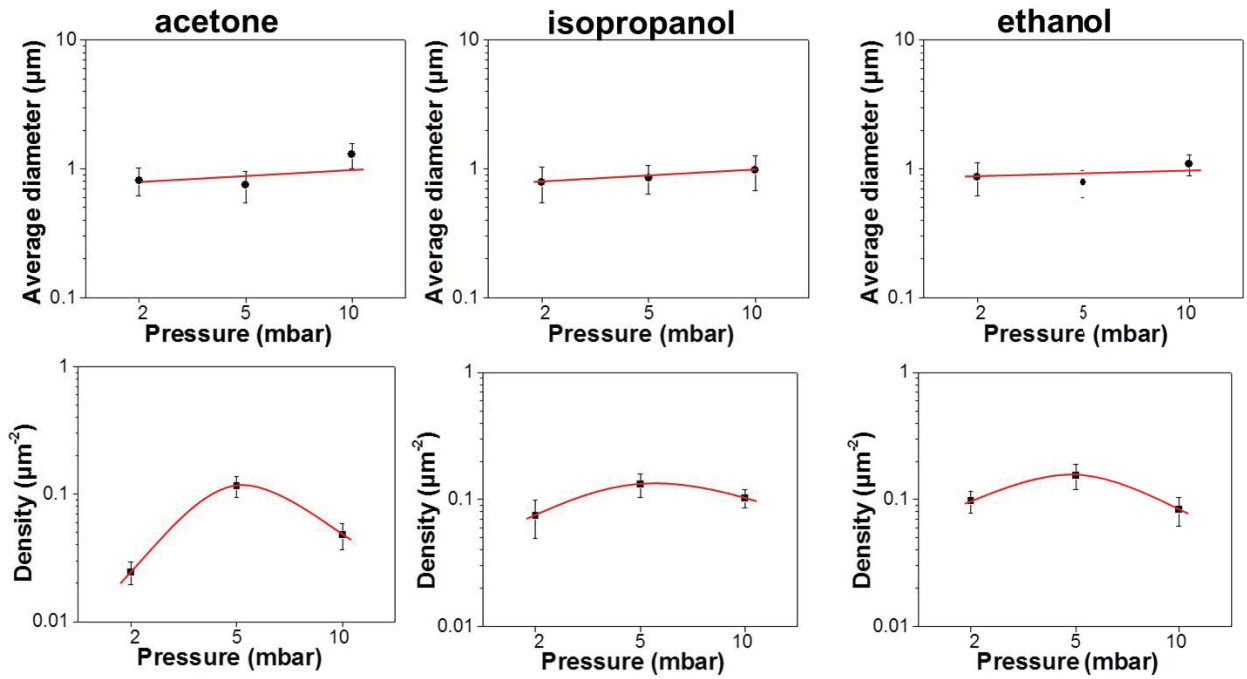

Fig. S5 Plots for all three solvents for average diameter (top row) and flake density (bottom row) with respect to reaction pressure.

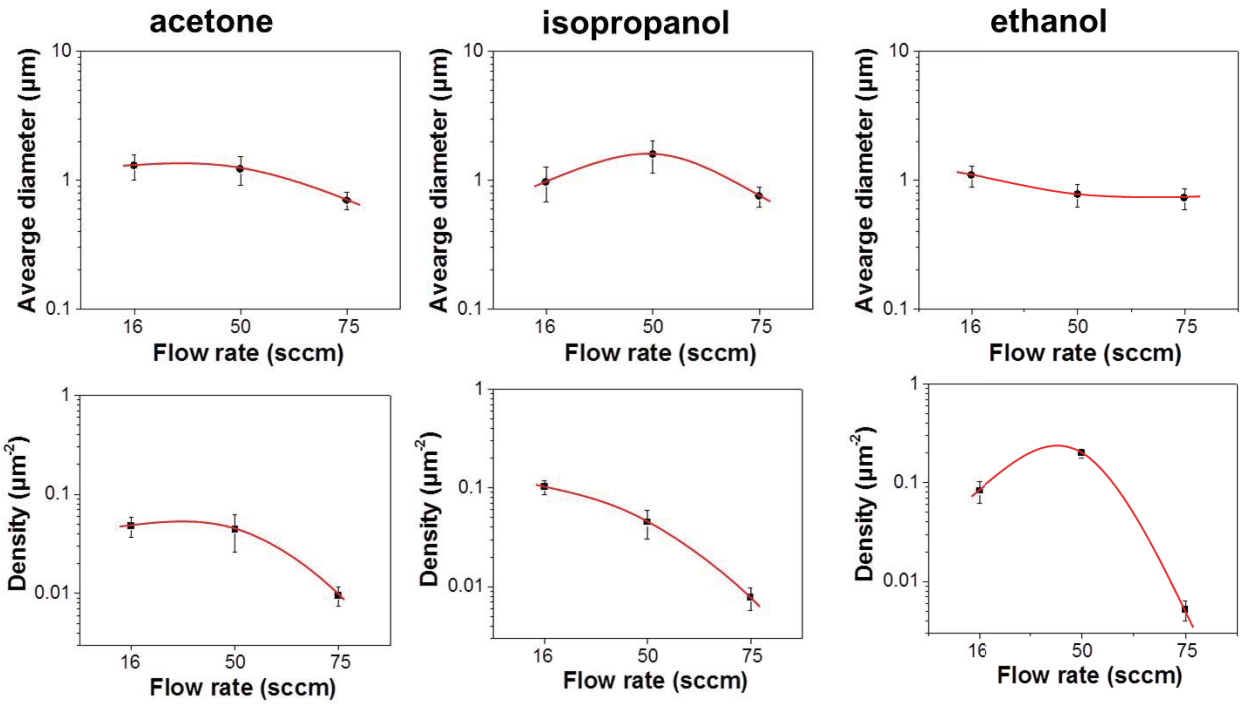

Fig. S6 Plots for all three solvents for average diameter (top row) and flake density (bottom row) with respect to reaction flow

Table S1. specific peak information of Raman spectra of graphene from temperature set

Temperature (°C)	solvent	D/G	2D/G	2D position
800	Acetone	2.9±0.2	3±0.1	2676±3
	IPA	3.0±0.2	3±0.2	2683±4
	EtOH	3.1±0.2	3±0.2	2696±5
900	Acetone	0.90±0.10	3±0.1	2690±5
	IPA	0.72±0.14	3±0.1	2687±4
	EtOH	0.39±0.08	3±0.3	2685±3
1000	Acetone	0.49±0.11	3±0.4	2681±4
	IPA	0.34±0.06	3±0.1	2688±4
	EtOH	0.26±0.09	3±0.2	2690±5
1025	Acetone	2.9±0.2	3±0.1	2676±3
	IPA	3.0±0.2	3±0.2	2683±4
	EtOH	3.1±0.2	3±0.2	2696±5

(IPA is short for isopropanol, 2-propanol; EtOH stands for ethanol)

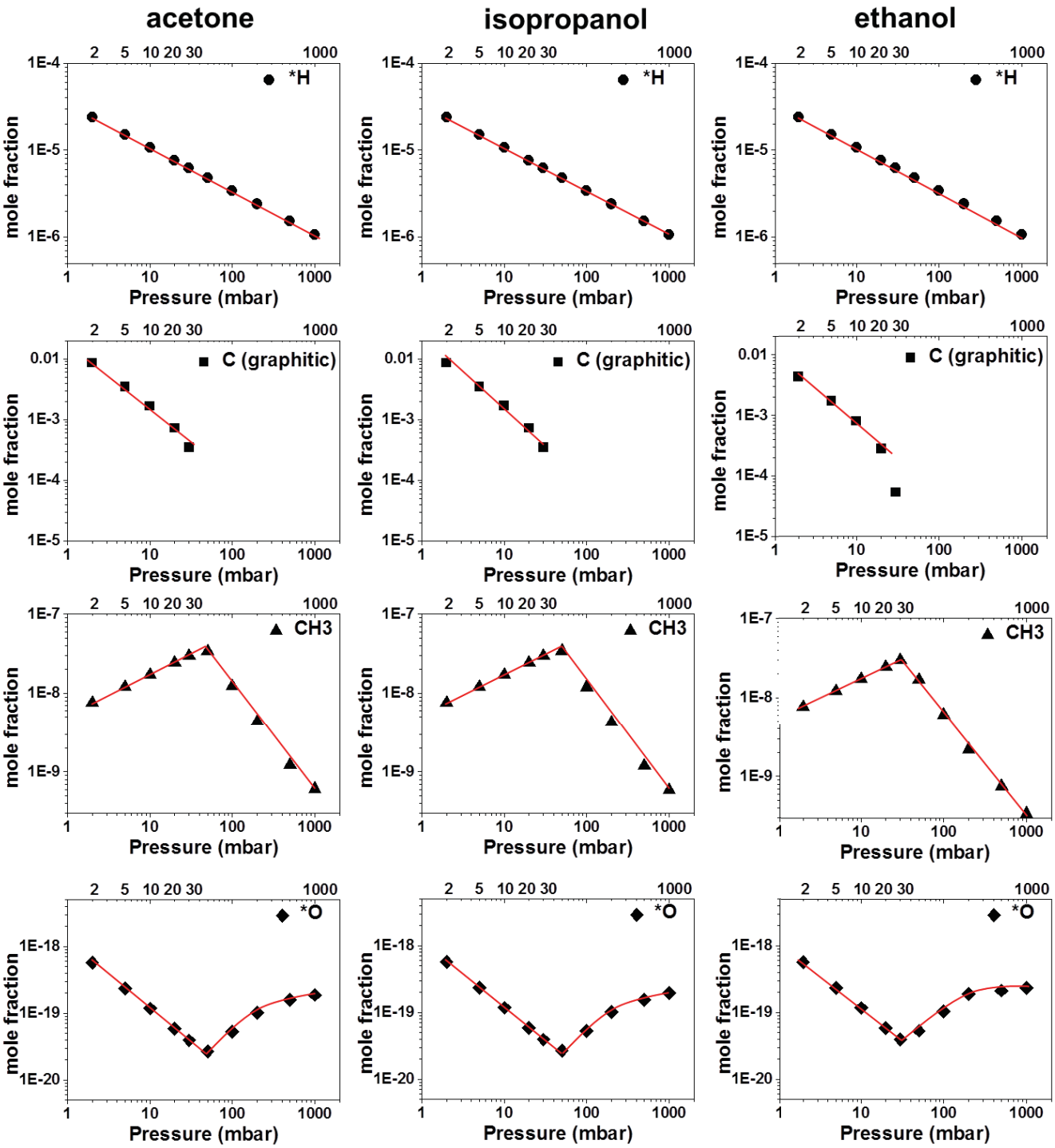

Fig. S7 The calculated mole fraction of radicals from acetone, isopropanol and ethanol (plus hydrogen) with respect to pressure. When pressure goes beyond 50 mbar, no graphitic carbon forms. When comparing to the fraction of graphitic carbon above 10 mbar, we see only a minute fraction of carbon is available.