Oligomeric Aminoborane Precursors for the Chemical Vapour Deposition Growth of Few-Layer Hexagonal Boron Nitride

Supporting Information

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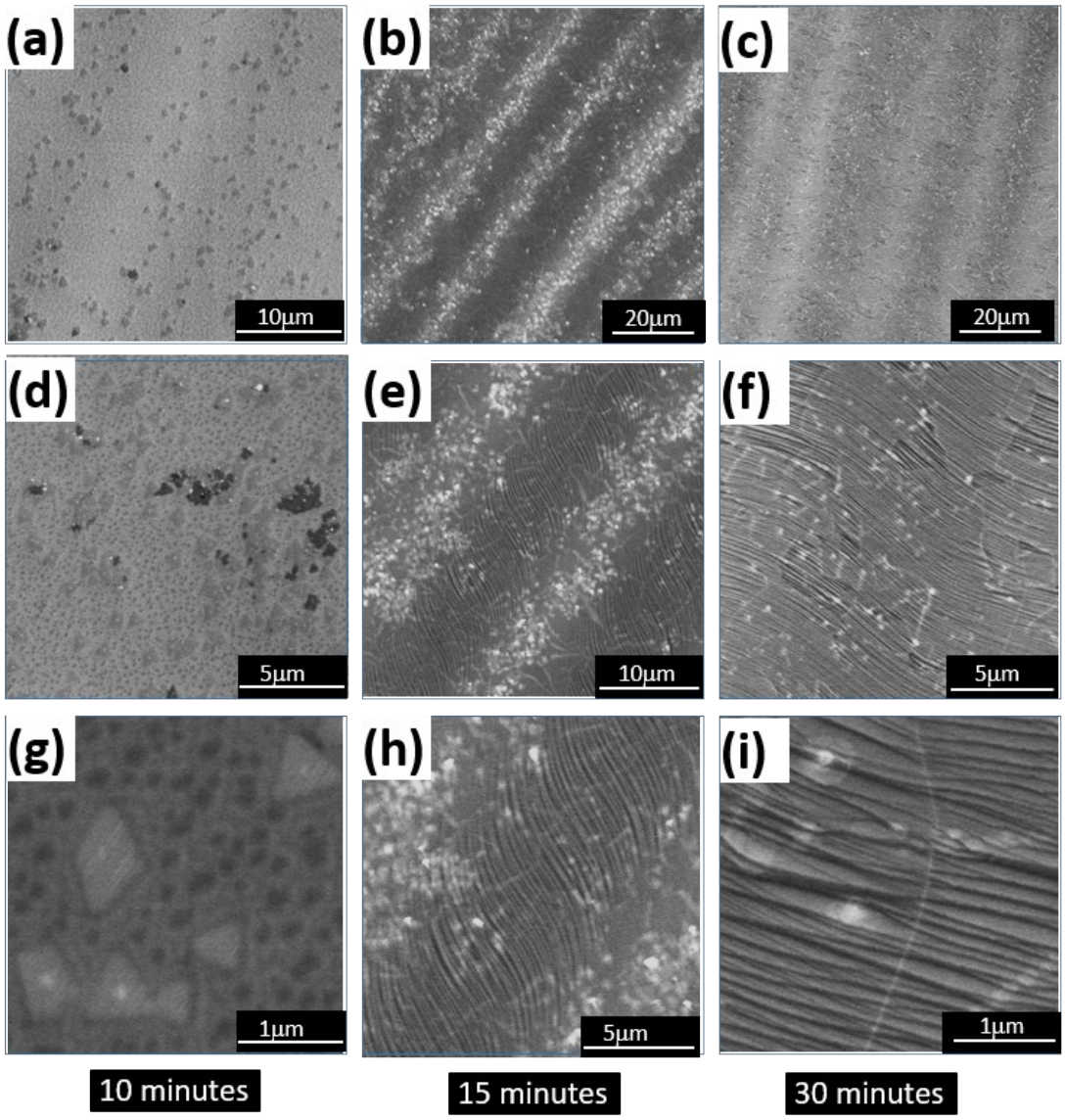

Figure S1. SEM images of the Cu substrate surface after h-BN CVD growth with ammonia borane precursor with (a), (d), and (g) 10, (b), (e), and (h) 15, and (c), (f), and (i) 30 minute growth durations.

For the 10 minutes growth duration, the h-BN crystals are formed on the copper substrate surface as shown in Figure S1 (d). Moreover the Figure S1 (g) shows the triangle shapes of the h-BN crystals on copper surface. While for the 15 and 30 minute growth duration, continuous h-BN film is formed, as shown in Figure S1 (e), (h), (f), and (i).

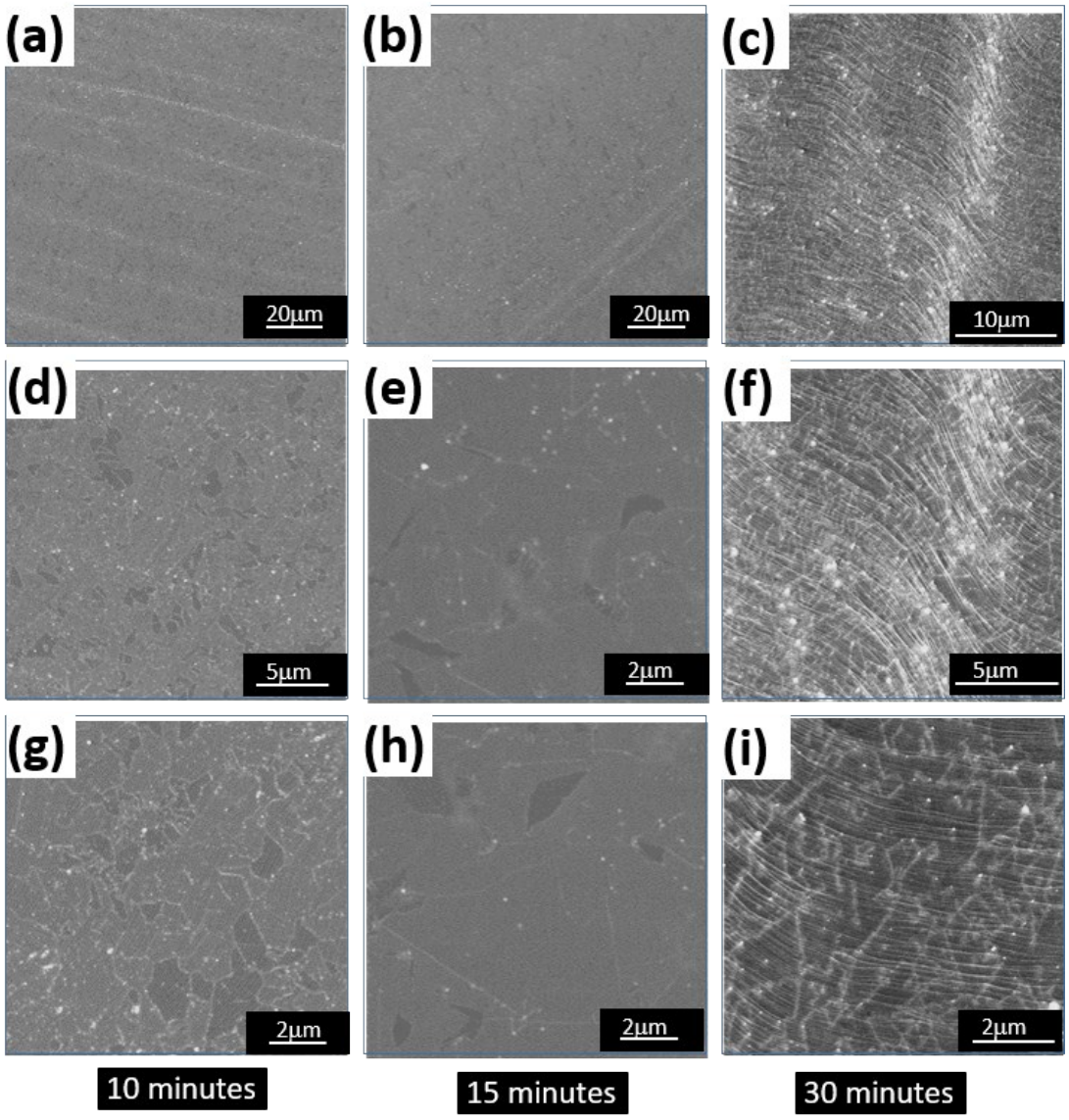

Figure S2. SEM images of the Cu substrate surface after h-BN CVD growth with DAB precursor with (a), (d), and (g) 10, (b), (e), and (h) 15, and (c), (f), and (i) 30 minute growth durations.

Figure S2 provides more SEM images of the DAB precursor grown h-BN continuous film on copper substrates with 10, 15, and 30 minute growth duration. Figure S2 (g), (h), and (i) are the zoomed in SEM images and show the white grain boundaries all over the surface. Unlike 10 minutes ammonia borane grown h-BN, no triangle shaped h-BN domains are found.

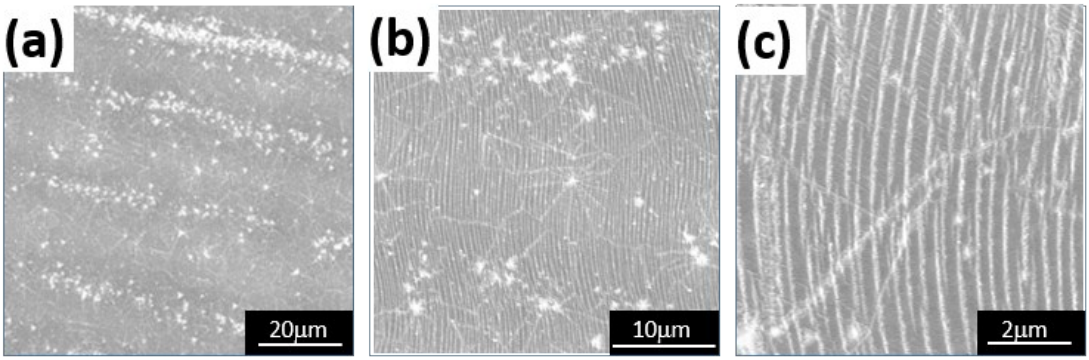

Figure S3. SEM images of the Cu substrate surface after h-BN CVD growth with TAB precursor with 30 minute duration.

Figure S3 show high, medium and low magnification SEM images of the TAB precursor grown h-BN film with 30 minute duration.

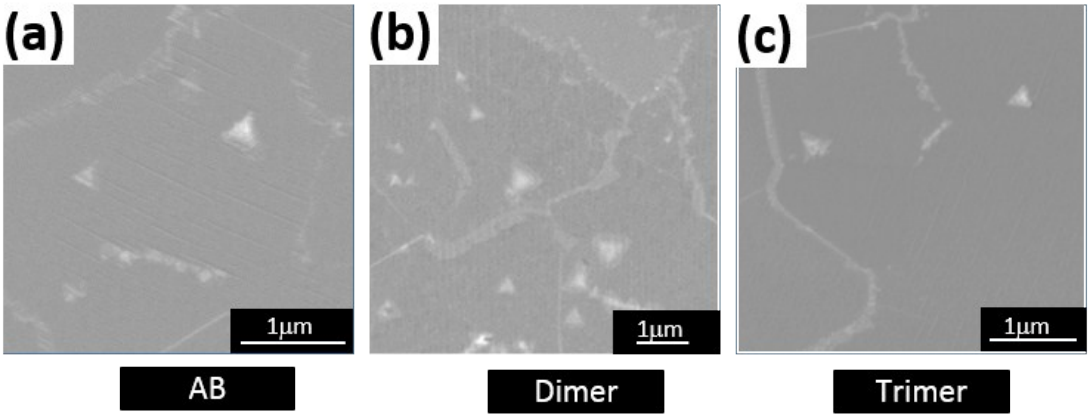

Figure S4. SEM images of the small triangle h-BN domains after CVD growth with (a) ammonia borane, (b) DAB, and (c) TAB precursor with 30 minute durations.

Figure S4 illustrates the small triangle domains which are observed on all the grown h-BN continuous film by the three different molecular weight precursor with 30 minute growth duration. This suggests that the formation of h-BN follows a combination of a layer by layer growth and island growth.

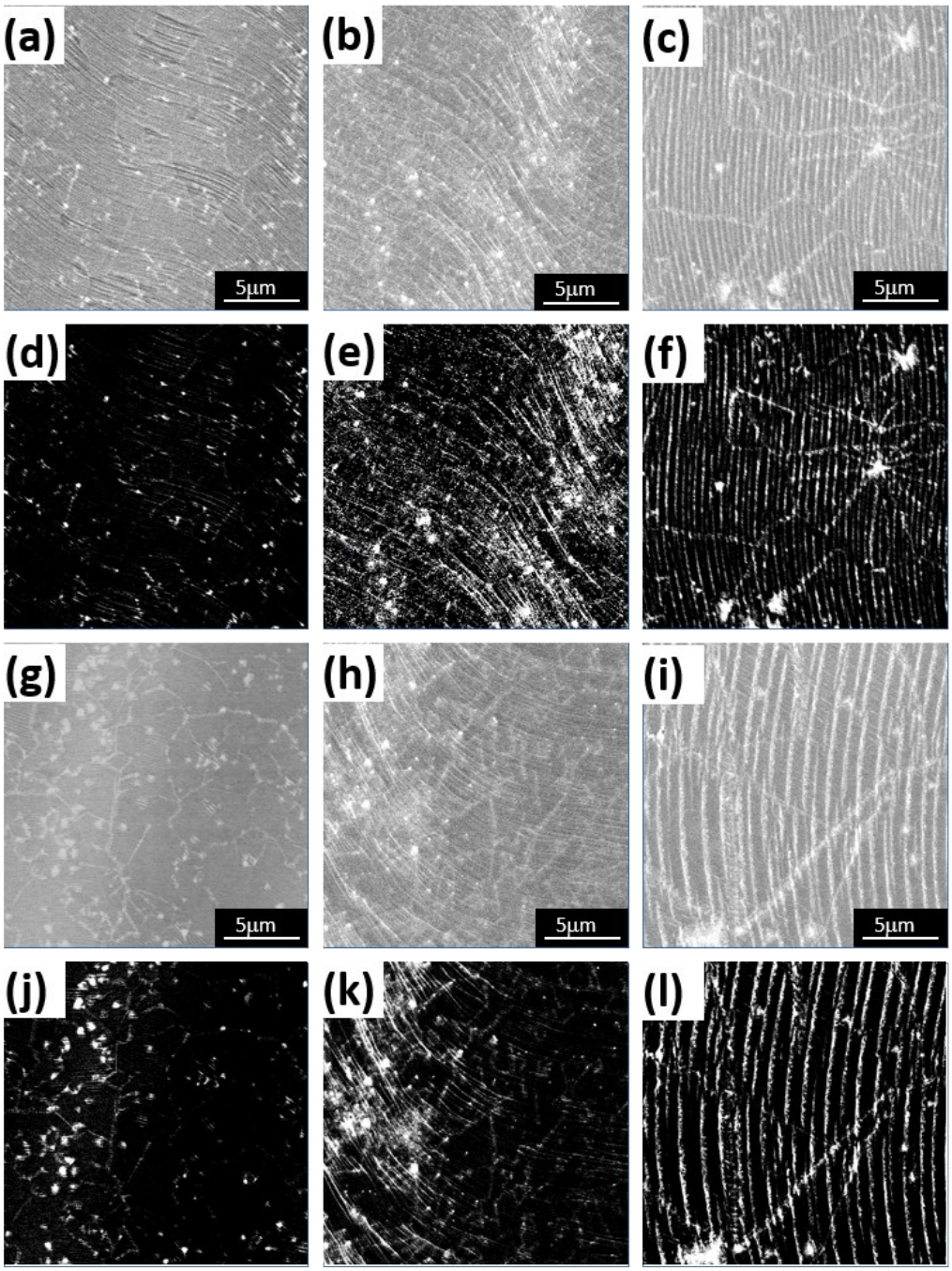

Figure S5. SEM images of the Cu substrate surface after h-BN CVD growth with ammonia borane (a) and (g), DAB (b) and (e), and TAB (c) and (i) precursor with 30 minute growth duration. The corresponding lowered images (d). (e), (f), (j), (k), and (l) are ImageJ processed figures and used to calculate the percentage of nanoparticles as the related surface, respectively.

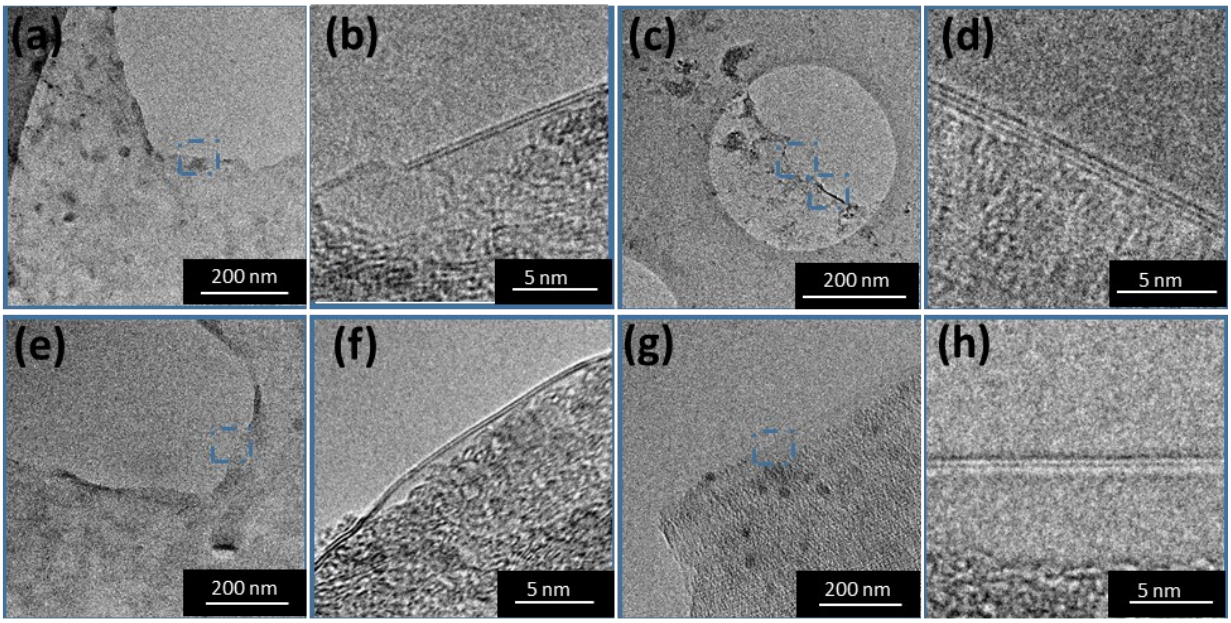

Figure S6. TEM images show number of layers of AB precursor 30 minute grown h-BN films near their folded edges. Low-magnification TEM images (a, c, e, and g) shows the folded edges of AB precursor 30 minutes grown h-BN film and the corresponding zoomed-in images (b, d, f, and h) from the marked regions.

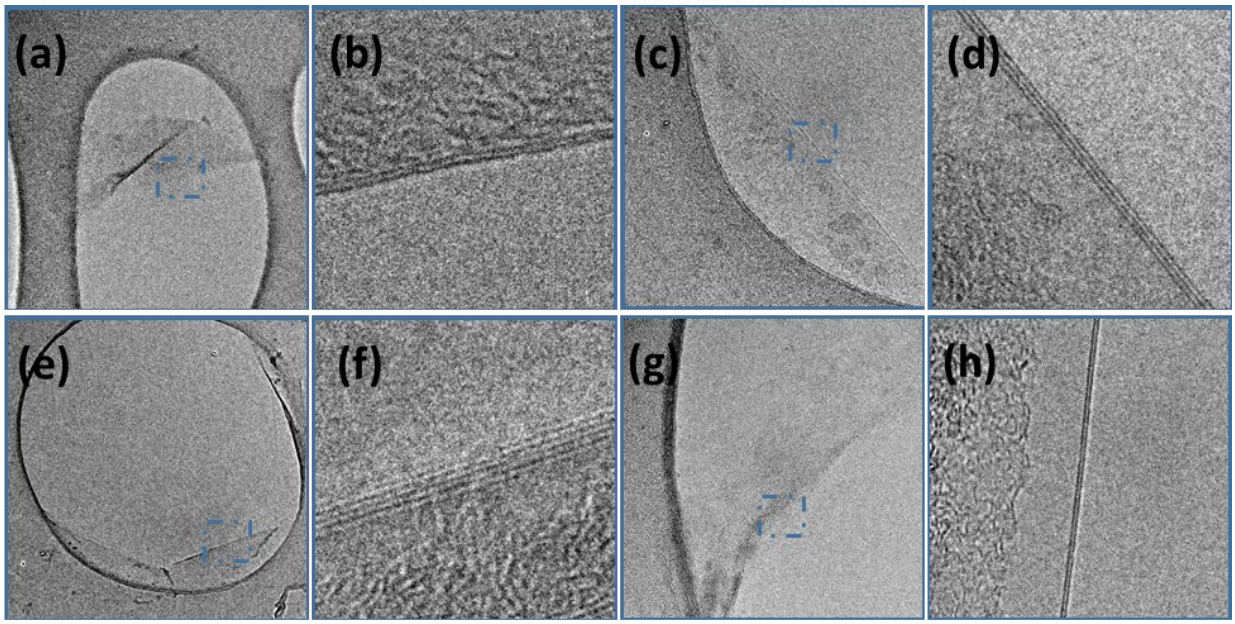

Figure S7. TEM images show number of layers of DAB precursor 30 minute grown h-BN films near their folded edges. Low-magnification TEM images (a, c, e, and g) shows the folded edges of

DAB precursor 30 minutes grown h-BN film and the corresponding zoomed-in images (b, d, f, and h) from the marked regions.

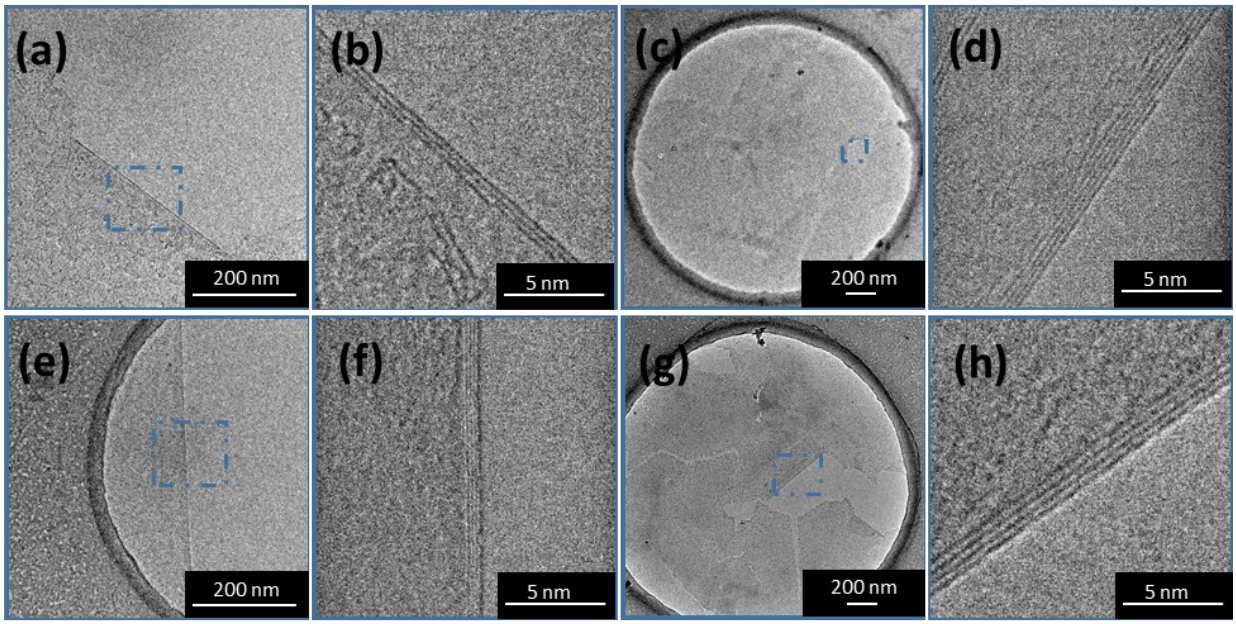

Figure S8. TEM images show number of layers of TAB precursor 30 minute grown h-BN films near their folded edges. Low-magnification TEM images (a, c, e, and g) shows the folded edges of TAB precursor 30 minutes grown h-BN film and the corresponding zoomed-in images (b, d, f, and h) from the marked regions.

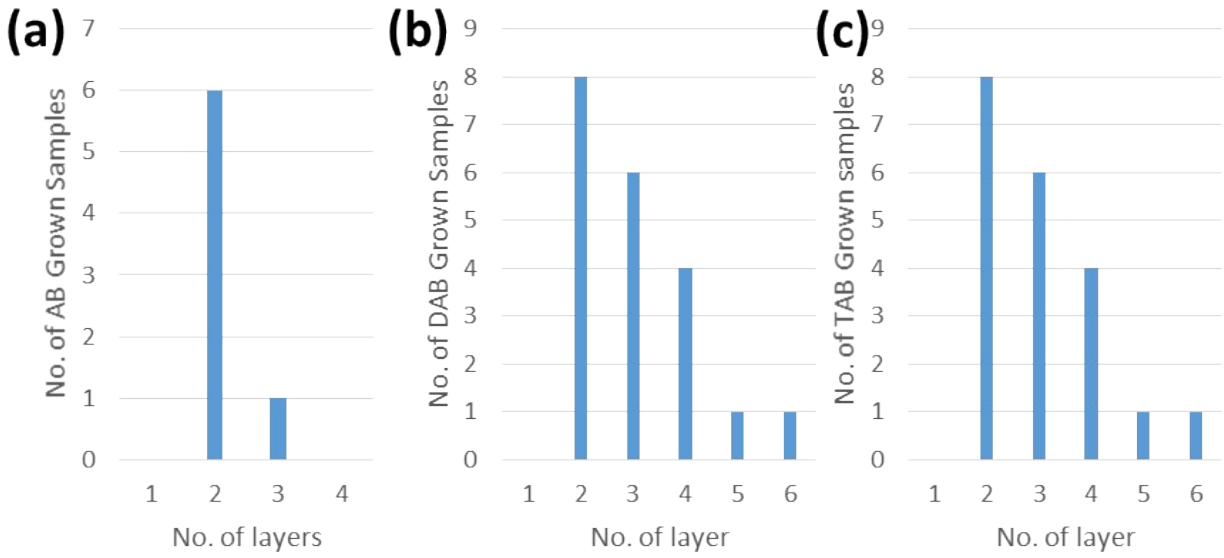

Figure S9. Statistics about the number of layers against the number of precursors grown h-BN films, such as (a) for AB precursor, (b) for DAB precursor, and (c) for TAB precursor, grown h-BN samples.