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Supporting Information

Interactions Between Liquid Ammonia and Graphitic Materials

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Figure S1. Reduced GO disperses at a higher concentration in an NH_4OH solution (right) compared to a 1.0 M NaOH solution (left) and a KOH solution (middle), even after standing for (a) two and (b) three days.



Figure S2. Surface tension of ammonia-water solutions. The data were obtained from ref. S1.¹



Figure S3. Deconvolutions of O(1s) XPS spectra of (a) pristine GO, GO treated with liquid nitrogen for (b) 1 min, (c) 30 min, (d) 7 hr, and GO treated with liquid ammonia for (e) 1 min, (f) 30 min, and (g) 7 hr. The black lines represent measured spectra. Red, blue, green, and pink lines are the curves fit for C—O, C=O, O=C—O*, and the baseline, respectively.² (i) The area-under-curve ratio of pristine and treated samples.



Figure S4. High resolution N(1s) spectra of GO treated with liquid nitrogen for (a) 1 min and (b) 30 min. The peaks are fit into low (A, blue) and high (B, red) energy components, with their centered positions labeled.



Figure S5. SEM images of the basal plane of (a) pristine GO, GO membranes soaked in liquid nitrogen for (b) 1 min, (c) 30 min, and in liquid ammonia for (d) 1 min and (e) 30 min.



Figure S6. SEM images of cross-sections of GO membranes soaked in liquid nitrogen for (a) 1 min, (b) 30 min, and in liquid ammonia for (c) 30 min.



Figure S7. FT-IR spectra of GO membranes treated with liquid ammonia and liquid nitrogen for different periods of time.



Figure S8. (a) Image of the as-made freestanding SWCNT membrane. SEM images of cross-sections of the SWCNT membrane (b) before and (c) after soaking in liquid ammonia.

References

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