Supporting Information

Ultrafastly Interweaving Graphdiyne Nanochain on Arbitrary Substrates and its Performance as Supercapacitor Electrode

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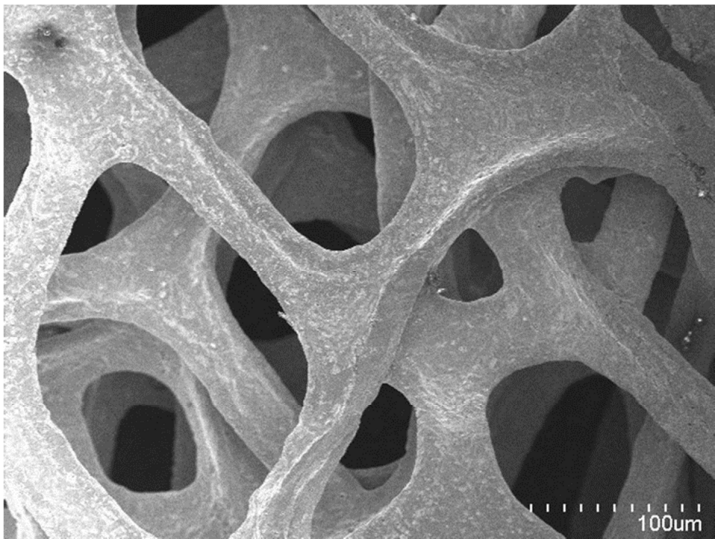

Figure S1. SEM image of the copper foam before growing GDY nanochain.

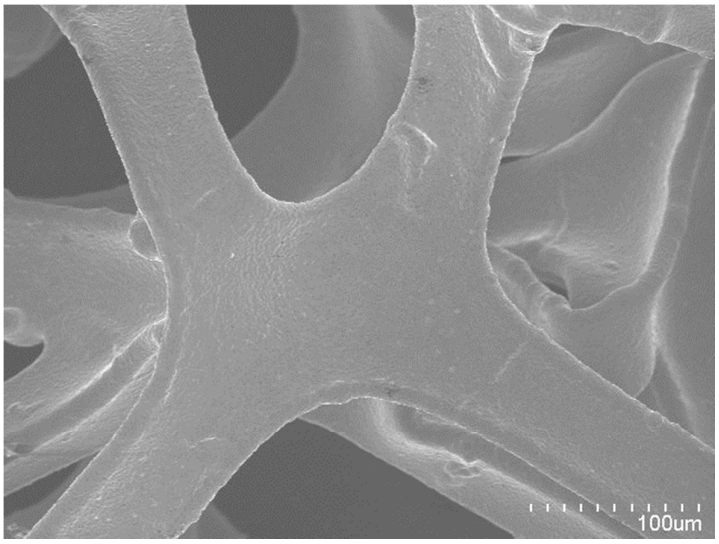

Figure S2. SEM image of the nickle foam before growing GDY nanochain.

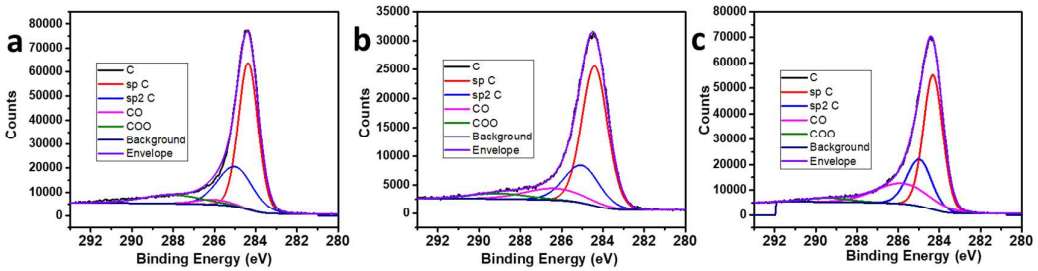

Figure S3. High resultion C1s XPS spectrum for GDY on the substrates of a) Cu, b) Ni, and c) Si.

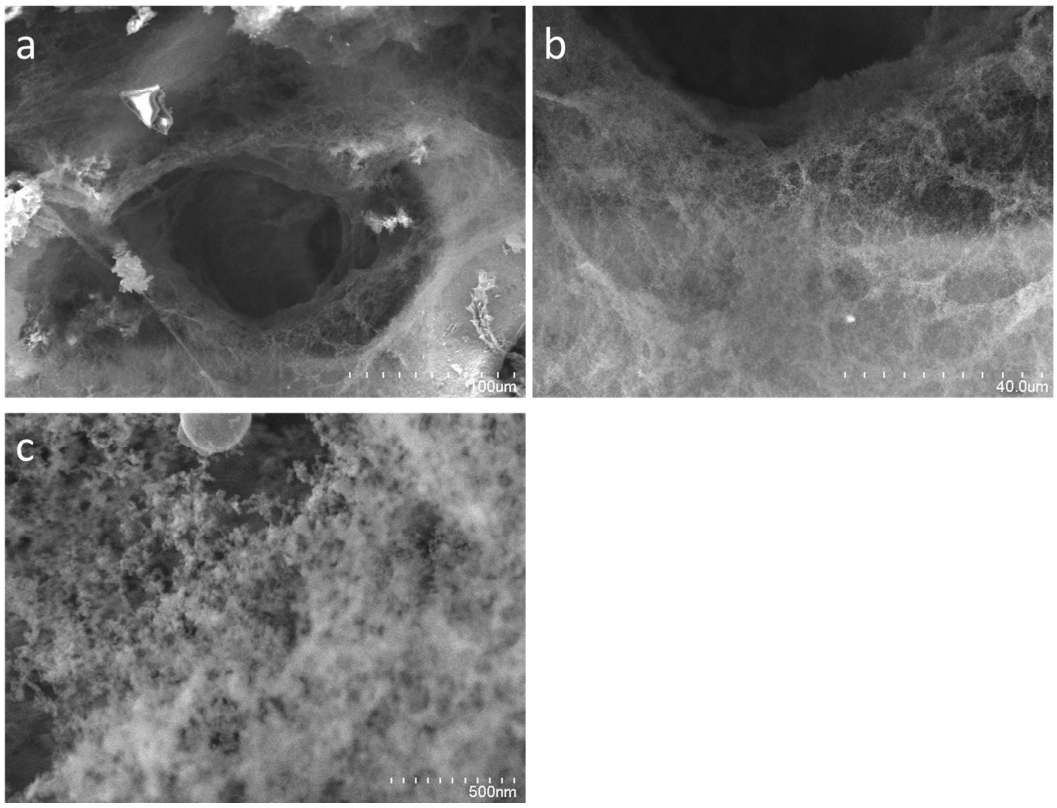

Figure S4. Typical GDY morphology prepared on the copper foam. a) large-scale morphology of GDY on the backbones and in the voids of Cu foam; b) and c) magnified image of GDY nanochain on the backbone of Cu foam.

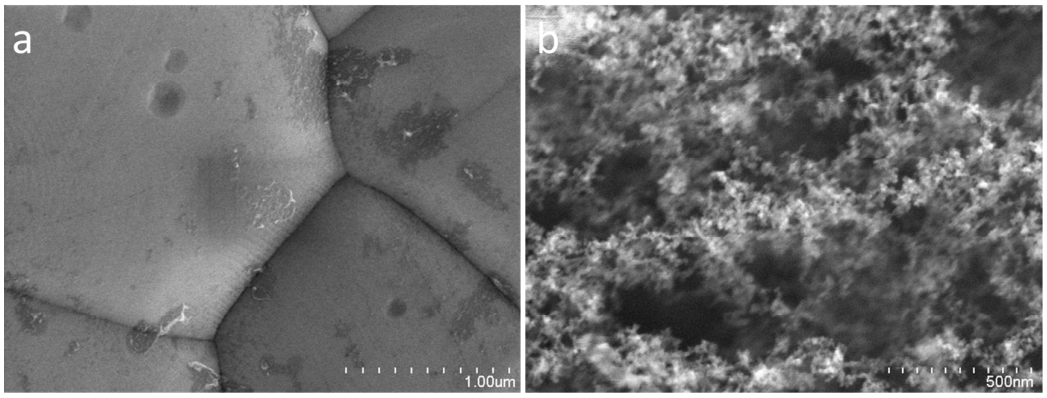

Figure S5. a) The surface morphology of the backbone of nickle foam; b) the magnified SEM of GDY nanochain on the nickle foam.

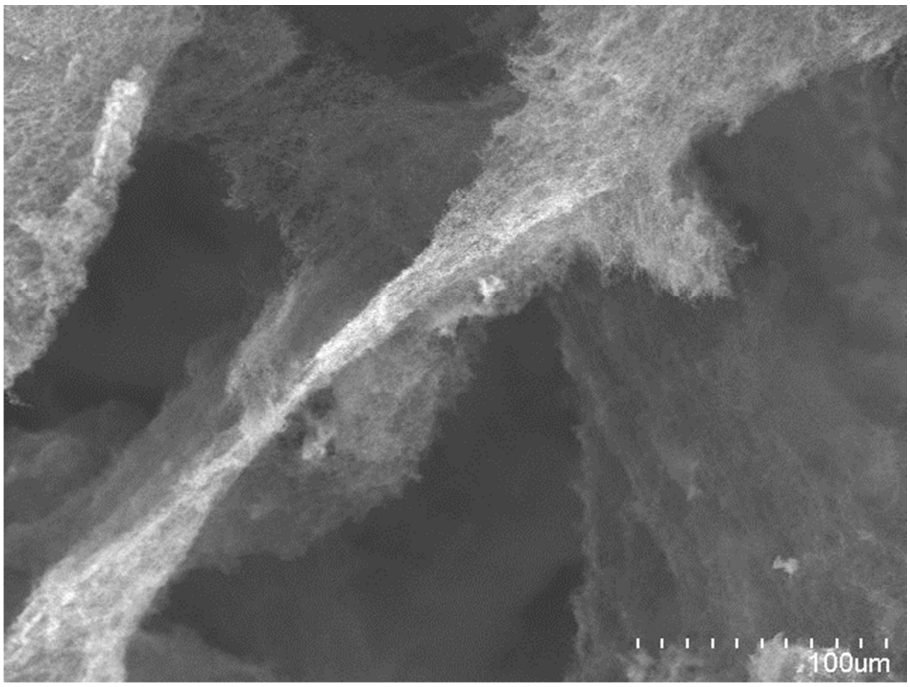

Figure S6. Large scale GDY in the voids of nickel foam.

The Oil/water separation is a successful application of the superhydrophobic mateirals in the treatment of industrial oily wastewater and oil spill accident. The superhydrophobicity of the 3D GDY on cupper foam is also performed in separating oil/water mixture by a home-made separation apparatus, where the as-prepared

sample is sandwiched between two glass tubes. For naked-eye viewing the separation process and separation efficiency, the dichloromethane as oil is dyed with the perylene diimide derivative. Due to the hydrophobic property of oils, the all-carbon porous architecture can trap the hydrophobic oil to reduce the interfacial energy between the substrate and the air, thus realizing the efficient separation of oil/water mixture. The photos in Figure S2 vividly exhibits the process in this case of separating the mixture of dichloromethane and water. As the superhydrophobic property will increase the intrusion pressure of water, it can be observed that a transparent water layer with the height of 5 centimeter is stably formed in the upside tube, indicating the superhydrophobicity successfully blocks the water pass through. Because of the higher density of dichloromethane than water, the dichloromethane drops on the upside will gradually sink to the bottom and transfer through the superhydrophobic separator. The separation efficiency of such 3D separators can be evaluated from the mass change of dyed chloromethane after and before the test, and is high up to 95%. Thus, it shows high potential in separating the water/oil mixture. Up to now, this ultrafast approach for decorating 3D substrates and obtaining the selective property against water/oil is one of the most moderate ways, including many inorganic and all-carbon modification strategies.

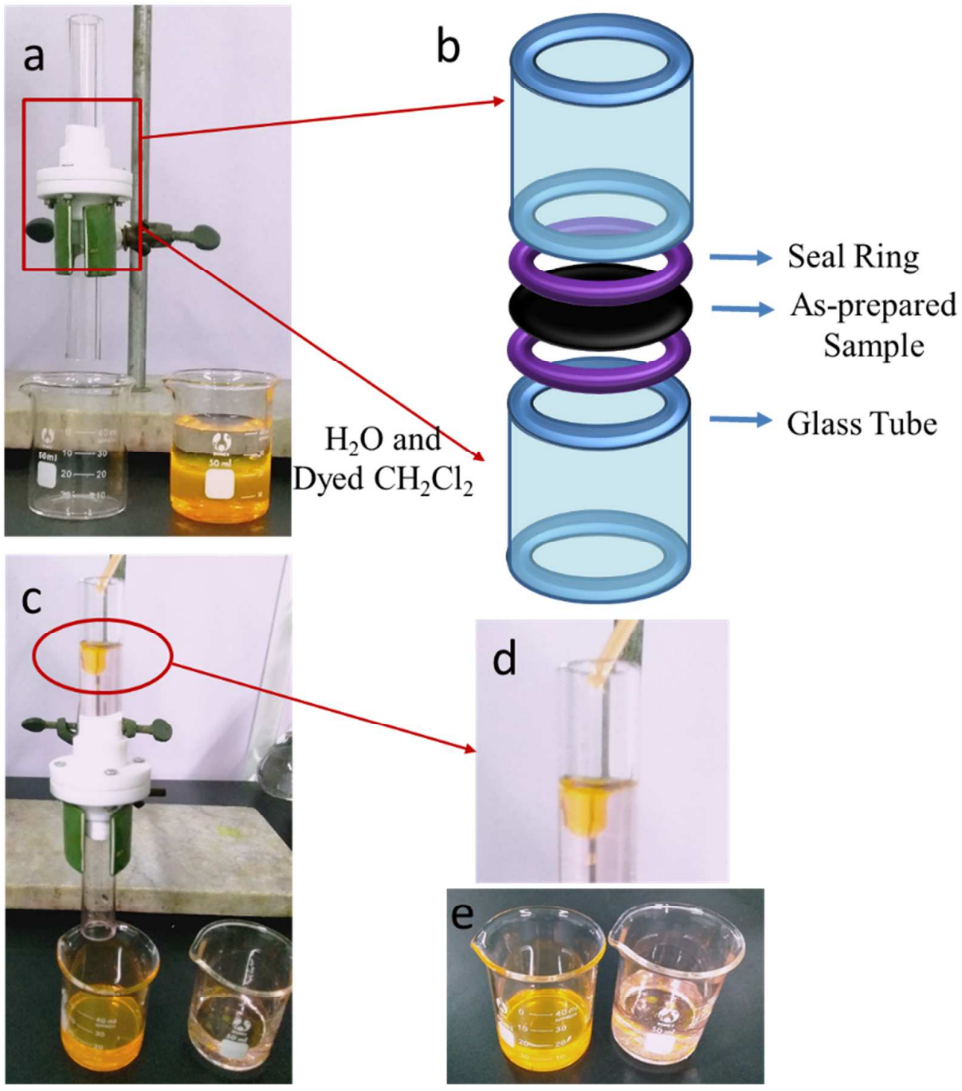

Figure S7. Oil/water separation test. a) Home-made separation apparatus for a dichloromethane/water mixture using all-carbon modified cupper foam; b) structure of the separation apparatus; c) photo of the separation process; d) the magnified oil/water interface during the separation process; e) the successfully separated water and dichloromethane.

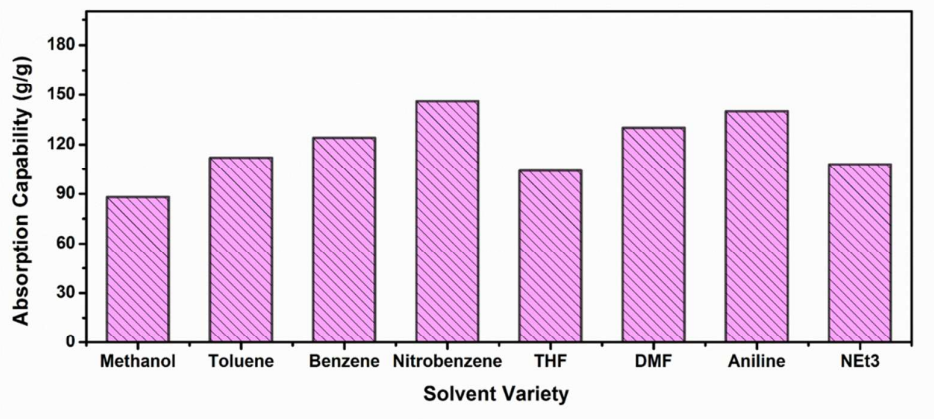

Figure S8. Absorbent ability of GDY foam on the cupper foam.

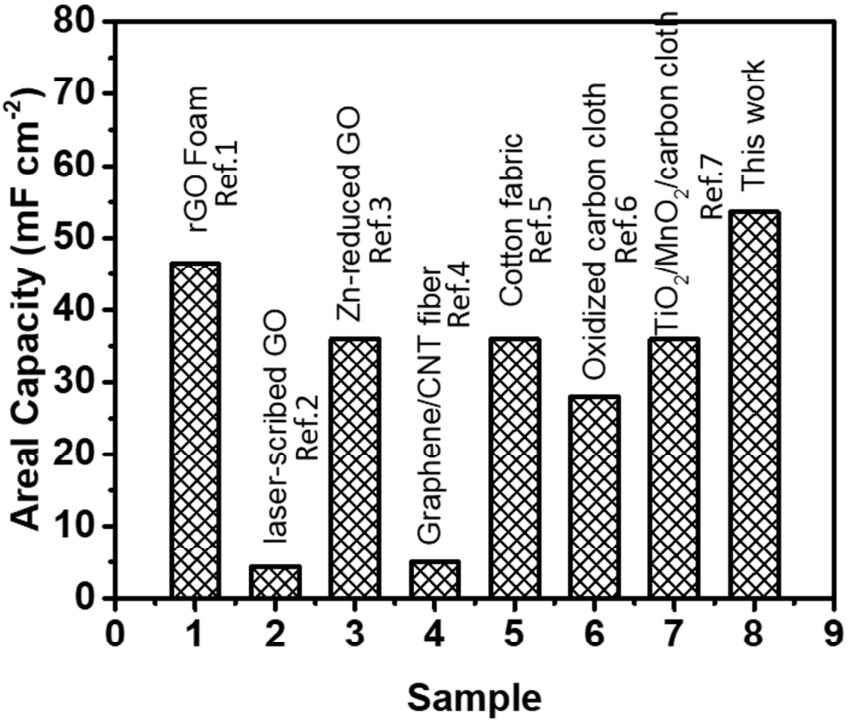

Figure S9. Performance comparison of the as-assembled supercapacitor based on the GDY with the reported materials in literatures.

Reference

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