# Large scale preparation method of high quality SWNT sponges

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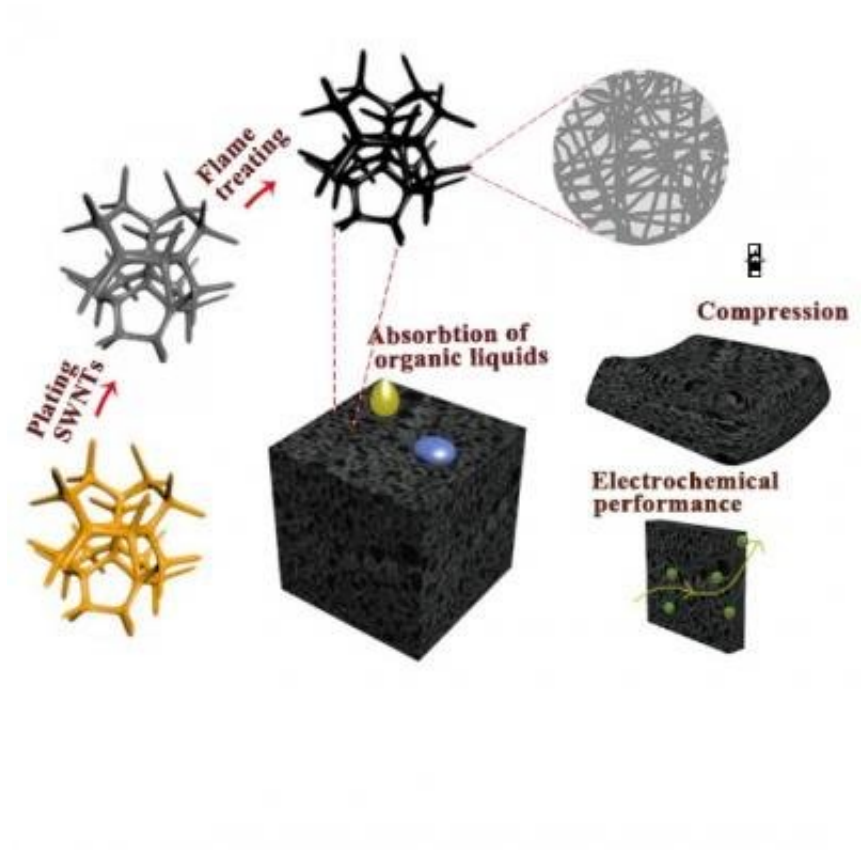


The 3D carbon nanotube sponge prepared by superfast flame burning method. Credit: Shihong Yue

In a paper published in *Nano*, a group of researchers report developing a simple flame-burning method to prepare single-walled carbon nanotube (SWNT) sponges on a large scale. The SWNT sponge has

multifunctional properties and has applications in waste cleaning, sensing and energy storage.

The researchers sought a fast method of mass production to prepare lightweight, porous carbon nanotube (CNT) sponges with with low energy. They discovered a method of preparing single-walled carbon nanotube (SWNT) sponges with a 3-D elastic interconnected hollow skeleton network by burning commercial polyurethane (PU) sponges coated with SWNTs.

The PU sponge is removed in an ethanol flame in less than 20 seconds, leaving sponge-like structures. Compared with previously reported chemical vapor deposition (CVD), the flame-burning method used in this work has the advantages of density control, low cost and suitability for large-scale production. Additionally, the sponge shape and size are controlled by pretreatment of PU templates.

The as-synthesized SWNT sponges exhibit a series of comparable properties, including high conductivity, moderate organic liquid adsorption, good elasticity and high specific capacitance. Also, the sponges could reach an ultralow density of 0.8 mg $cm^3$ and keep the original geometry of the PU template without distortion. The high hydrophobicity endows the SWNT sponges with an admirable adsorption rate and capacity for organic solvents. The sponges could reached a maximum compressive stress of 11,500 Pa at 80 percent strain, but also withstood more than 1000 compression cycles at 60 percent strain. Further, used as a flexible electrode material, the porous SWNT sponges achieved a high specific capacitance and 95 percent capacitive retention over 10,000 cycles.

**More information:** Liang Lu et al, Superfast Preparation of SWNT Sponge by Flame Burning Method and Its Adsorptive, Elastic and Electrochemical Properties, *Nano* (2018). DOI:

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