

New way to make 3-D carbon components

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Kun (Kelvin) Fu, an assistant professor of mechanical engineering at the University of Delaware, has used a 3D printer to make pure carbon nanotube (CNT) architecture that are lightweight, strong, and highly porous. Credit: University of Delaware

UD's Kun Fu discovers new way to make 3-D carbon components

Kun (Kelvin) Fu, an assistant professor of mechanical engineering at the University of Delaware, has used a 3-D printer to make pure [carbon nanotube](#) (CNT) architectures. Fu is believed to be the first person to

make these lightweight, strong, highly porous CNT structures using a 3-D printer.

Fu's creations could be useful in the manufacture of composites, which are made from two or more [materials](#) that have different properties when combined than they do as individual materials. Carbon nanotubes can add strength to polymer composites. They are also electrically conductive and chemically stable, opening up a world of creative opportunity for use of this material in batteries and electronics, [water purification](#) and desalination technologies, tissue-engineered medical implants, and more.

"We can print a series of 3-D complex structures using [carbon](#) nanotubes. This is a pure CNT [structure](#) and no binder or polymer is needed." said Fu, "According to literature, no one can do this."

It is difficult to make high-density carbon nanotube inks concentrated enough to flow through a 3-D printer and form 3-D structures, but Fu developed a novel and completely different technique. Using a unique 3-D printing technique developed recently in Fu's lab, Fu printed a variety of complex CNT 3-D structures, including tiny replicas of the Eiffel Tower and the Great Wall of China, a small pig's face, a honeycomb, and a UD logo. Each one measures just a few centimeters wide and is strong but lightweight. The structures can sit on top of a dandelion that has gone to seed without crushing the fragile white seeds.



3-D carbon nanotube atop a dandelion. Credit: University of Delaware

Fu plans to share how he did it at the IMECE International Mechanical Engineering Congress & Exposition in November.

"This is quite an exciting discovery as it opens up applications in developing miniature and intricate sensors, serving as complex catalyst supports and also in [biomedical applications](#) where the focus will be to grow cells or use them as 3-D designed scaffolds," said Suresh Advani, George W. Laird Professor of Mechanical Engineering and associate director of UD's renowned Center for Composite Materials.

Provided by University of Delaware

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