

Random Walk

HOLLOW PILLARS TO HOLD TINY NEEDLES

Although these pink and green structures look like exotic blooms, they're actually made of carbon nanotubes—and they might one day make shots less painful. Made at Caltech by Adrianus Indrat Aria (MS '08, PhD '13), a former graduate student in the laboratory of Morteza Gharib, Hans W. Liepmann Professor of Aeronautics and Bioinspired Engineering, these flowerlike projections are made by "growing" densely packed nanotubes—long, cylindrical, crystalline carbon nanostructures—into a vertical stem on a silicon wafer. The researchers then rearrange the nanotubes into the hollow-pillar configuration. Only a few tens of micrometers wide and a millimeter tall, the tiny pillars hold equally tiny composite microneedles, which are envisioned for future use in medicine as a replacement for the commonly used hypodermic ones. The researchers hope that these hollow pillars and microneedles could pave the way for self-administered and pain-free therapeutic and diagnostic systems in the future.